



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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PROPRIETORS. }

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[VOLUME V.—No. 37.]

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, SEPTEMBER 17, 1836.

HARTFORD AND NEW-HAVEN RAILROAD.

PROPOSALS will be received from the 22d to the 29th of the present month, at the Engineer Office of the Hartford and New Haven Railroad, (corner of East and Collis streets, New Haven,) for grading the Northern Division of the Railroad from Meriden to Hartford—being a distance of 18 miles. After the 22d maps and profiles of the different sections will be exhibited at the Engineers Office.

ALEX'R. C. TWINING, Engineer.
New-Haven, Sept. 9. 37—3t

HARLEM RAILROAD.

We are glad to learn from the following letter, that daylight has been made to shine through the tunnel of this road. We paid it a visit the other day while the men were at work, and never have we seen so apt a likeness to Pandemonium as we have figured it in our minds.

The smoke was so dense that each member of the party, six in number, was obliged to hold his candle close to the ground in order to discover his path.

The miners were furnished with fresh air by means of a blowing apparatus.

The rock is of an unusual hardness, and has offered great difficulties. The undertaking has now assumed a more pleasing character, and we look forward to its speedy termination.

To the President of the New-York and Harlem Railroad Company.

YORKVILLE, Sept. 12th, 1836, }
9 o'clock, A. M. }

Sir:—I have the satisfaction of informing you, that this morning, at 3 o'clock, the miners succeeded in piercing the remaining part of the tunnel rock, so as to pass lights from the south to the north entrance of the tunnel; and it is probable that by 5 o'clock this afternoon a free passage will be opened to walk through. This event, which has been brought about earlier than was anticipated by several days, entitles the miners to much praise for their steady and unwearied efforts for a fortnight past; and considering the extreme density of the rock, which in some parts almost defied the temper of the drill, will be regarded, I trust, by yourself, and the public, as a very extraordinary evidence of the power of human labor and skill over difficulties which were apparently insurmountable. I beg leave respectfully to remind you that the 15th of September (the day you have heretofore predicted would be the era of this event) has not yet come.

Very respectfully, your ob't serv't,

JOHN RUTTER,

Superintendent of the Tunnel Section.

P. S. Although lights have been passed through the opening, the miners wait for the Board of Directors before any person will be permitted to cross the barrier. A raw hand incautiously attempting it this morning, was saluted, according to the custom of miners, with a bucket of water, and had to retreat with a wet jacket.

For the Railroad Journal.

The following is handed us by one of the Commissioners in this city. Mr. Johnson fully corroborates Judge Wright as to the feasibility of the Oswego route to the West;

OSWEGO AND UTICA RAILROAD.

We have much pleasure in laying before the public the following letter of E. F. JOHNSON, Esq., Civil Engineer, on the subject of this contemplated Railroad. Mr. J. is now employed as Chief Engineer on the Hudson and Erie Railroad, and his opinions on any subject connected with Civil Engineering are entitled to much weight. From his recent survey of the route for a Ship Canal from this village to Utica, he is enabled to speak of the route with a view to the construction of a Railroad with much confidence—and his opinion on this subject, taken in connection with that of the veteran Benjamin Wright, Esq., must, we think, be regarded by the public as conclusive evidence of the eligibility of this route.
To G. H. McWhorter, C. J. Burekle, T. S. Morgan, and A. P. Grant, Esq's, Commissioners.

GENTLEMEN,

In reply to your request that I should give you my views relative to the proposed railroad from Utica to Oswego—I would state, that having been employed to make an examination and estimate of cost for a canal on a large scale, between the points above mentioned, I am somewhat familiar with the general shape of the country, and with the facilities it affords for the construction and profitable operation of the contemplated road.

The Utica and Schenectady Railroad, at its termination in Utica, is 19 feet below the surface of the Erie Canal at that place; and as the canal is one continued level to the Rome summit, the total rise to the latter point from Utica is only 19 feet; and the distance being 15 miles, the average ascent will probably not exceed two feet per mile; or, supposing the road to run directly through Rome village, which is elevated thirty or forty feet above the canal, the average will not vary much from three feet per mile.

From the Rome summit to the surface of the Oneida lake the descent is seventy feet

or if estimated from Rome village, about one hundred feet, and distance thirteen miles.

The land on the north shore of the Oneida lake rises gradually from the water, and to obtain the best ground it may be necessary to preserve an average elevation of say twenty-five or thirty feet above the level of the lake, which gives for the thirteen miles above mentioned an average descent per mile not exceeding five feet.

In proceeding along the north side of the lake the line will be moderately undulated—not however deviating necessarily very much from a level for a distance of thirty-five miles, until it attains the vicinity of the Oswego river, between Three River Point and Fulton. The remaining distance to Oswego is about fifteen miles, and the descent to the village about one hundred feet, or to the level of the lake, about one hundred and forty feet—making an average of not more than ten feet per mile, and not exceeding, as I imagine, more than thirty feet per mile, for the maximum.

The shape of the ground (with the exception of the portion last mentioned, near the lake,) is very favorable, and will be found, as it regards cost of construction, level character of the grades, straightness, and all the facilities for a cheap and rapid transit, superior to most other lines of Railroad in the country.

The route, the general features of which I have described, will be seen by an inspection of the map, to be very direct—the total distance not varying much from seventy-eight miles, whereas, the distance by the Erie and Oswego Canals is ninety-eight miles.

You will understand me as expressing no opinion as to the location of the road.—There may be other and more favorable routes than the one above mentioned, with which I am not acquainted, all of which I presume will be duly examined before the final location.

The section of country through which the road will pass is rich in natural resources, and is rapidly improving; and when the favorable position which Oswego occupies by nature, for concentrating the trade and travel to and from the north and west is taken into consideration, there is little doubt that the road in question will ultimately become one of the great leading thoroughfares of the country.

Yours, very respectfully,
EDWIN F. JOHNSON,
Civil Engineer.

New-York, Aug. 30, 1836.

From the New-York Times.
ENLARGEMENT OF THE ERIE CANAL.

Messrs. Editors—I embrace the first moment of my return from the country, to thank you for your editorial remarks in your paper of the 22d, and in your just rebuke to a writer, with the signature of "S.," requiring him to confine himself to facts and arguments, instead of "individual merits or demerits," they are not, as you truly observe, "subjects of newspaper controversy."

"S." states that a "careful perusal of the several articles published in your paper will exhibit a gross medley of folly, inconsistency and ignorance," and confidently appeals to them, for the truth of his assertions, and would wish to convey the idea "that they are evidently written to create false impressions, in relation to the enlargement of the Erie Canal." The newspaper discussion of which, appears to create so much sensitiveness in some parts of this State.

From an intercourse with you, of some

years, and your intimate knowledge of the rise and progress of "the ship canal project," I trust I can appeal for the honesty of my purpose and purity of motives, in defending from attack, the able report, survey and estimates of E. F. Johnson, Esq., Civil Engineer, to the Legislature of 1835, Assem. Doc. 195. That I take this gentleman, (or Oswego senior,) for my oracle, as stated by "S.," instead of the reply of the "Delphic Oracles," in the employ of the State, is very natural. We were early co-laborers in the same much abused work, viz:—A Ship Canal around Niagara Falls, to be continued from Oswego to the Hudson. But to test "S.'s" sincerity as to "the gross medley and folley of 'Oswego Junior's' arguments, and attacks on the Canal Board," (which I deny,) I tender the proposition to "S.," to reprint, at mutual or entire expense, the articles in pamphlet form which have appeared in your paper, and will also print, at the same time, if accepted, a second edition of Oswego Senior's "appeal to the last Legislature," in relation to the proposed enlargement of the Erie Canal, and then leave the public to judge, if a single argument and statement, that the friends of "the ship canal project" have been answered by those who have attacked it as "visionary," and only use hard names instead of arguments. First—we say, and challenge a reply to the statements we have made, that a cheaper, better, and more effective work, for transportation, can be constructed from Buffalo via Niagara Falls, Lake Ontario, Oswego River, Lake Oneida, Utica, and through the valley of the Mohawk to the Hudson, to secure to this city the trade of the "Far West," in preference to first enlarging the Erie Canal—as we say, with the evident, if not certain risk, of interrupting the trade upon it, consuming double the time and money it will take to make a separate and more perfect work.—Second.—We have stated our conviction, in which we are supported by the opinion of able engineers, that the enlargement of the Erie Canal to a Ship Canal, (7 feet by 70,) cannot be progressed in "without interfering with, or interruption to the trade upon it," with the certain destruction of a large portion of its present fixtures, and at an unnecessary expenditure of at least two dollars for one, over what would be required for a separate canal, as indicated, instead of the enlargement of the Erie Canal, which after all is nothing but a patch-work, and unworthy the character of the Empire State, in offering facilities to the west, to approach this great centre of commerce of the United States.

Third.—We state and prove, on better data and estimates than was before the Legislature of 1835, when they passed their "Carte Blanche" law to enlarge the Erie Canal, without a sufficient examination of the subject, involving, as it does, with damages, the expenditure of at least fifteen to twenty millions of dollars, and 12 years of time! that a more perfect work can be constructed, via the Falls, &c., at about one half the expense it will take to enlarge the Erie Canal; that then we shall have two channels of trade to provoke competition, and last, not least, have two canals instead of one, and at a less cost than to enlarge one, and we give as a reason, the fact, that by the Oswego River, Lakes Ontario and Oneida, &c., there is only about 150 miles of artificial navigation to be made, instead of 363 of enlargement.—Providence in his bounty having, on the Oswego route, provided natural waters, conceded in this country to be the cheapest for transporta-

tion, although denied by Mr. Brinley, and it was only on the authority of Mr. Western, an English civil engineer, (who pronounced the Oswego route impracticable for a canal, and deficient in water for a feeder,) that carried the Erie Canal alongside of Lake Ontario to Lake Erie!!!

Allow me to conclude by saying, that in my view, it can only be selfishness, that can argue against opening the Oswego route—at all events, simultaneously with the proposed enlargement of the Erie Canal to Buffalo. Certainly its "Mud Lock," (the scarecrow of the West the last winter,) with its tow path, should be promptly replaced, and put in repair. Let the canal be also enlarged, and we will trust to the enterprise of Oswego forwarders, with the liberality of our Canadian neighbors in the use of their Welland Canal to secure to this city the commerce of the West and "Far West," and to break up the real monopoly and combinations that exist on the Erie Canal to the serious injury and division of much of our trade from New-York to Philadelphia, and particularly from Ohio. That there have been combinations with the Erie forwarders, after this State reduced its tolls to secure the Ohio trade, is too notorious, (spread on our public documents,) to be seriously denied.

Such has been the delays of transportation through this State, from the crowded state of our canals, that it has called forth "public meetings" in Chillicothe, in Ohio, to consider and remedy their difficulties.—Why then delay an hour, the construction of a separate channel, and "let well alone," the Erie Canal, with its million and a half of tolls, instead of risking its usefulness, whilst enlarging in the summer, or building houses over any part of it, to do "necessary mason work with the stoves, at a proper temperature in the winter," as is gravely proposed in Assem. Doc. 99, pages 8 and 10, of the last Session. J. E. B.

REPORT OF THE SURVEY OF THE ROUTE OF THE HUDSON AND DELAWARE RAILROAD, BY JAMES B. SARGENT, ESQ., ENGINEER OF SAID ROAD.

To the President and Directors of the Hudson and Delaware Railroad Co.:—

GENTLEMEN—Having in pursuance of your instructions, examined the country from the Hudson River at Newburgh, through Orange County, to the east line of the State of New-Jersey, with a view to selecting the most feasible route for a Railroad, and having made such selection, and carefully designated the same upon the ground—a map of the country traversed, together with a profile of the line, are herewith submitted, and I beg leave to report—

That the route so designated and surveyed is very favorable in all its leading features; that the grades adopted not only come within the useful, but the most effective range of Locomotive power; that the curvature will not in any instance conform to a radius of less than fourteen hundred and thirty-two feet; that the soil over and through which it is proposed to construct the work is generally of a firm and durable material, while it is intermixed with less rock and other hard substances than is ordinarily encountered on lines of like extent; that a spirit of kindness and liberality is manifested by a majority of the landholders through whose lands the line has been traced, which, with their gratuitous cessions of the right of way, affords a flattering earnest of their future confidence in, and liberal support of the project.

The line commences at the junction of Liberty and Washington streets, in the village of Newburgh, at an elevation of 112 feet above the steamboat docks, and runs in a south-westerly direction, and crosses Chamber's Creek about four hundred feet above Reid's paper mill, thence pursuing a similar and very direct course to Tooker's Gate, on the Blooming-Grove and New-Windsor turnpike, thence in a more southerly direction skirting the Bog meadows and passing into the valley of the Otter Kill or Murriner's Creek about two miles below Salisbury, and near John M'Gill's house.—Thence along the immediate valley of the Kill passing the villages of Salisbury and Washingtonville, Brooks and Thompson's Mills, and the Kill itself seven times; thence the line bears more west and again crossing the Kill leaves Campbell Hall half a mile on the south, and passing through a part of Tamerack swamp reaches the low summit between the Otter and Walkill valleys at Le-grange. And thence passing the summit, pursues the east bank of the Walkill until opposite Boges Island, passing Phillipsburgh, George Phillips' Mills, &c. At Boges Island the line crosses the Walkill and enters upon the broad flats, usually known as the Drowned Lands, and continues near to the west-margin of them to the Jersey line, at times occupying the high lands that extend into the valley, and at others following upon the flats themselves.

A line has also been traced from the dock in front of the United States Hotel, to connect with one described above at Chamber's Creek. This was examined with a view of establishing a track for the conveyance of freight directly to and from the river without the aid of stationary power. That its adoption will effect the object and afford an acclivity upon which the motive power employed upon the main part of the road may act successfully is undoubted, since the ascent is but 100 feet to the mile, and the distance 6260 feet; and since the engines and horses may be employed at intervals between the arrival and departure of trains, in moving freight upon this, and in getting it ready for shipment, or passage on the road.

It should also be borne in mind that by far the greater quantity of freight would descend, and, of course, would require no power except the empty cars: as the loaded ones would descend by gravity, and be controlled by the brakes or clogs attached to them, hence no additional power would be required, except to haul up the freight destined for the west.

Commencing the line so far south as Washington-street was not with the design of terminating the passenger track at that point, but because the line from it could be so directed that it would have command of an entrance into either Montgomery, Grand, or Liberty streets, and thus enable the company to establish their depot at any point in either of the three that they might deem proper or most advantageous.

The main course of the line above briefly described is believed to be preferable to any other, general one, that can be obtained through Orange county; from the fact of its central position, and passage through the only uninterrupted valley that traverses it from east to west. But, aside from these natural and evident advantages, sufficient in themselves to satisfy any disinterested observer, the undersigned has had before him the surveys of 1831, by H. G. Sargent, Esq., and of 1835 by J. B. Jarvis, Esq., either of which afford ample evidence of the inutility if not entire impracticability of adopting a more northern route; hence a mere personal recognisance of that suggested

north of Snakehill fully confirmed the opinion derived from the surveys before mentioned, and led to the conclusion that a more minute investigation would only add to the cost of the survey and more fully develop its difficulties.

A recognisance has likewise been made of a route leaving the one selected at Le-grange, passing through the village of Goshen and along a range of Islands that extend themselves centrally through the Drowned Lands. This route is practicable, and in many respects favorable; but, inasmuch, as it would add to the aggregate rise and fall of the road more than 100 feet, without improving its directness or facilities for construction, the line following the immediate valley of the Walkill is preferred.

Although the line selected, as a whole, may justly be considered favorable, there are nevertheless obstacles of no inconsiderable magnitude to be encountered between Newburgh and Salisbury, owing, as will be seen by reference to the profile, to the rapid rises, and consequent inadmission of ascents of sufficient ratio to attain the elevation required to pass the southern spur of Snakehill, without cutting and filling more than would be necessary under a fuller command of the grades. The topography too of this section of country is much varied and broken by small tributaries of Chamber's Creek and Otter Kill, which have their origin in the ranges of Snakehill, and have formed wide and deep valleys where the line comes in contact with them.

Of these obstacles the most prominent are at Chamber's Creek, the valley south of J. R. Caldwell's house, and the ridge and deep ravine where the line enters the valley of the Otter Kill. It is proposed, however, to build a long bridge at Chamber's Creek, and to substitute truss work for the embankment at the ravine near Mr. Caldwell's.—This will greatly reduce the first cost, and enable the company to replace it when it shall decay, with a more durable structure at an expense greatly below what would now have to be incurred, as they would then have the aid of their road to transport earth and other necessary materials.

At Salisbury the route enters a more extended and favorable field. The hills recede from the stream and present a broad and level valley for the site of the road, the ample capacity of which for affording a cheap and desirable location, is only interrupted by the windings of the stream, which renders it necessary to cross it so many times, and occasionally brings the line in contact with points of the high lands that bound it. This favorable range may be said to extend to the New-Jersey line, as the summit at Le-grange dividing the waters of the Otter and Walkills, is low and level, and may be considered a continuation of that spacious and fertile valley formed principally on the one side by the Shawangunk mountains, and on the other by the continuation of the Highlands. Nevertheless the east shore of the Walkill is occasionally abrupt and the stream continues to be closely bound by the high land until it reaches the proposed crossing place at Boges Island; thence the flats vary from a half to six and eight miles in width, and are so little elevated above the stream and so level that they are overflowed by almost every rain, which has given rise to the appellation of Drowned Lands. But although the frequent crossings of the Otter Kill, the bridges at the Walkill, the Rutgers and Mechanicstown Creeks, together with those of many streams of minor importance, and the cuttings where the line comes in con-

tact with the high land are items that will add no inconsiderable sum to the cost of the road; yet taken as a whole this part of the route in point of cheapness of construction, ease of grades, length of tangents, and lightness of curvature, will be surpassed by few, if any, works of equal length in the State.

The maximum grade upon the line is 45 feet to the mile, and may with little additional expense be reduced to 40, but since it occurs but in one instance, and that where the line is nearly straight, it is deemed economical and judicious to adopt it.

Grades descending to the west occasionally occur, and will swell the aggregate amount of rise and fall on the whole route, they cannot, however, be avoided without rendering the line much more circuitous than it now is, and either would be far more objectionable than the plan proposed, since these grades in no instance exceed 20 feet to the mile, and will still give a preponderance of power to the descending grade much beyond the actual difference that will exist between the quantities transported.

The length of the road from Liberty-street to the Jersey line will be

	37 8-10 miles.
From the dock in front of the United States Hotel	33 2-10 do.
The actual rise from Liberty street to the N. J. line	278 feet.
The total amount ascended for the same is	313 do.
The total amount of rise and fall for the same is	460 do.
To which add 112 feet for the same from the River which gives the total rise and fall	572 do.

The estimated cost of the road per mile, including graduation, superstructure, land, depot, buildings, carriages and machinery, &c. is \$10,714 30

Multiplied by 37 8-10 miles gives the total \$105,000 00

With these general remarks we pass to a description of

First, The PLAN OF THE ROAD.
Second, The POLICY AND PROSPECTS OF THE PROJECT.

And refer the company, for information relative to other minutiae, to the accompanying map, profile, table of grades, and estimates in detail.

OF THE PLAN OF THE ROAD.

This part of our subject is of the utmost importance. The experience of the pioneers in Railroads has already cost a credulous and confiding public vast sums of money in speculative and extensive experiments. Experiments that from their attendant cost and varied results, have not only checked the progress, and rendered doubtful the completion of works of the first importance to the community, but that for a time cast a gloom over the whole system of railroads, and prevented the undertaking of enterprises of the kind, however favorable and necessary they might appear, until a more encouraging precedent had been presented, than was exhibited by the earliest roads.

But the public have now the gratification of seeing a system of constructing and applying power to railroads that renders them far superior to every other mode of internal communication in speed, safety, and capacity for accommodating their increasing wants; nor is it the least interesting fact of their progress in this country that out of the hundred different plans that have been tested, the simplest and cheapest of them all

is at this day taking precedence, and is most generally approved.

The plan recommended for the road of which we are treating will, I trust, be found consistent with the experience of the day. It will not materially differ from those adopted on the principal routes in this state, and will present a graded surface of 20 feet clear of ditches, with slopes of one to one in excavations, and of one and a half to one in embankments. This will give ample room for two tracks of 4 feet 9 inches in the clear, each.

The superstructure will have two continuous and parallel lines of sills composed of white pine 4 by 9 inches, and not less than 14 feet long each. These sills should be imbedded in trenches sunk in the graduation so that the upper side of them will correspond precisely with the grade of the road. Transversely to these, ties will be placed every three feet measuring from centre to centre. The ties should be seven and a half feet long, and 6 by 6 inches square, and of chestnut, white oak, or white cedar timber; also have notches of 2½ inches deep to receive the wood rail and the spike for securing it to the sills, and guarding against lateral pressure. In the notches of the ties will be placed the wood rail, and be secured by red cedar, locust, or white oak wedges. The rail to be composed of Norway pine, and be in lengths of 18, 21, 24, 27 and 30 feet, and 6 by 6 inches square. The whole to be surmounted with an iron plate rail 2½ by ½ inches, which should be firmly spiked to the wood rail and underlaid at the joints by connecting plates. The horse path to be formed of materials from the side of the road, and slated or graveled as the material is most convenient.

It is confidently believed that a road upon the above described plan, with a single track and suitable turnouts, will, for the present, be capable of performing all the business that will accrue to it, and that an additional one will meet the demands when its facilities are known and appreciated, and its freight is drawn from all the vast resources that must ultimately contribute to it.

THE POLICY AND PROSPECTS OF THE PROJECT.

The Charter of the Hudson and Delaware Railroad grants to the company the privilege of connecting with the New-York and Erie Railroad, the one projected from the Jersey line through the valleys of the Wallkill and Pepo Cotton creek and the Paulins kill to the Water Gap on the Delaware River, and through it, with that now actually executing from the Water Gap to the Susquehanna River, upon such terms as the contracting parties shall agree.

The New York and Erie Railroad, it is well known, is rapidly progressing. That through New-Jersey is now being surveyed under my directions, and will undoubtedly prove sufficiently inviting to capitalists to insure its completion at an early day, after it is known that the Hudson and Delaware Railroad is to be extended to meet it at the line.

Thus it will be seen that the Hudson and Delaware Railroad is ultimately to become the outlet for all the surplus productions of a country widely extended, and reaching far beyond its actual limits, that it is to receive and transmit to the Hudson the freight and passengers concentrated upon more than a hundred miles of railroads in New Jersey and Pennsylvania; roads that will penetrate the richest agricultural and mineral districts of the former and the vast coal beds of latter, while its passing the track

of the New-York and Erie road necessarily implies a connection with and participation in the business of transporting freight and passengers from the whole southern tier of counties to and from the great emporium of commerce. That the Hudson and Delaware Railroad is secure in this latter means of affording a revenue to the company, needs no better evidence than the fact that the distance from the mouth of the Chechuck creek, (the most probable junction) by the way of Tappan landing to the city of New-York, is, (as given in the report of James Seymour, Esq., upon the New-York and Erie Railroad,) 82½ miles, while by the way of Newburgh it will be only 25½ miles by way of railroad, and 60 by the Hudson River navigation, making in all 85½ miles. And the rise and fall upon the route proposed for the former is 1308 feet, and on the latter only 426 to Washington street, and 538 to the dock in front of the United States Hotel.

The route, therefore, via Newburgh is preferable to that via Tappan landing, and will afford the cheapest and most expeditious means of transit for freight, of every description. Cheapest, because the actual difference in distance between the two routes is but 3½ miles, and because the route via Newburgh will not only have 770 feet less rise and fall to encounter (which alone will throw the balance on account of traction vastly in favor of Newburgh,) but because it will have with an increase in total distance of 3½ miles, an excess of river navigation of 30 miles. And the river affords means of transporting both passengers and freight cheaper than it can ever be done by railroads. Most expeditious because the same power will give equal speed, and an equal quantity can be applied and give an excess of speed.

It is, however, urged that the termination of the New-York and Erie Railroad at Tappan landing will not be as likely to expose its business to interruption by ice during the winter season, as if it were to terminate at a more northern point. This is undoubtedly true, so far as it is consistent with the actual circumstances that will attend its termination at that point. But these circumstances give some plausibility to the suggestions of a more northern route, and as it is understood that the water in Tappan Bay is shallow for some distance into the stream, and that the entrance into the harbor is annually interrupted by ice, it is certainly questionable whether Tappan or Newburgh harbor is preferable for the winter season. It is true that the water at Newburgh is deepest, and it is equally true that water congeals most rapidly where it is shallow and spread over a large surface, hence it is believed that the harbor of the latter will be equal if not superior to the former in the winter season, and undoubtedly preferable for the remaining portions of the year.

This difference too will remain relatively the same if the New-York and Erie Company adopt any of the routes proposed for crossing the Wallkill and continuing to Tappan landing; and any of them can be approached upon ground favorable for a junction. Even should they ultimately adopt the Middletown route they may be joined at that place by passing the Wallkill at Stoney Ford and gradually ascending the high lands west of Philipsburgh, without exceeding the maximum grade between Newburgh and Salisbury, and over ground that will admit of a cheap construction of the work. Or the connection may be made with the same line in the valley of the Wallkill.

But notwithstanding the importance of a connection with the New-York and Erie

Railroad, and the immense increase of revenue that the Hudson and Delaware Railroad Co. will derive therefrom, it is believed that still greater advantages are to be gained from its connection with the more southern interests. By this another and important part of Orange County is to be served. The extensive and durable water power of the Otter Wall, and Rutgers Kills, with the Mechanicstown Creek, brought into full and active use, and a manufacturing interest created that will one day rival in importance, usefulness and value, that so long and justly celebrated for its agricultural productive-ness.

The ultimate object of this route has, however, already been alluded to. But as the introduction of mineral coal to market through its channel is of primary importance, it may be well farther to remark that the distance from Newburgh to the Delaware River will be about 81 miles, thence "to the very centre of the coal mines" 53 miles, making the total distance from Newburgh to the coal beds 134 miles, and eleven miles more reaches the Susquehanna river, and the North Branch division of the Pennsylvania canals. And further, that it is stated by high authority that "we can upon completion of our road," meaning that from the Delaware to the Susquehanna, "deliver coal in quantities at the Water Gap at \$1 50 per ton, and sell it at that price." Now if this can and will be done, the coal in vast quantities may be thrown into the New-York market at \$4 per ton. But if it were to cost \$5 50 per ton to deliver it, this channel would still successfully compete with any other engaged in the traffic.

Having thus alluded to the general resources that the road will have to augment its business, add to its importance and increase its revenue, I submit the following estimates with a view of showing that it will pay a large per centage on the cost, even under the most limited circumstances that can exist. They are based upon the supposition that the New-Jersey road is not built, and that the transportation on the whole and parts of the line will be equivalent to that of the items enumerated for the whole distance from Newburgh to the New-Jersey line.

ESTIMATED ANNUAL RECEIPTS.

40 Passengers daily each way,		
80 for 300 days of the		
year, 24,000 yearly at \$1 50	\$36,500	
4,000 Cords of Wood,	1 75	7,000
Rails, Posts, Timber, Stone,		
&c.		2,000
1,000 Tons of Butter,	1 50	1,500
1,500 Tons of Pork and Live		
Stock,	1 50	2,250
150,000 Bushels of Grain and		
Vegetables,	4	6,000
5,000 Tons of Pressed Hay,	1 50	7,500
40,000 Bushels of Lime,	8	3,200
500 Tons of Iron,	1 50	750

RETURNING FREIGHT.

2000 Tons of Gypsum,	1 75	3,500
1000 do. Salt,	1 75	1,750
4000 do. Merchandise of		
various kinds,	1 75	7,000
		\$78,950

ESTIMATED ANNUAL EXPENSE.

Interest on first cost,	\$28,350	
5 per cent. on the perishable part		
of the superstructure,	6,000	
10 per cent. on the Cars, Engines,		
Horses, &c.	3,000	
Superintendence, repairs, fuel, &c.		
&c.	16,000	
Total,	\$53,350	

\$53,350 deducted from the estimated annual expense, leaves 25,600 dollars as the net income, over and above all interest, and deducting the three last items in the annual expense, and adding the remainder to the net income, gives 53,950 dollars, as the annual revenue, or THIRTEEN AND ONE-THIRD per cent. on the capital invested.

The above estimates, though stated in round numbers, are deductions from much minute data, and it is believed that those of the receipts will be found generally far below the actual tonnage that will pass upon the road, and in no one item exceeding it. In fact, with the exception of pressed hay and lime, equal quantities are now hauled into Newburgh over the turnpikes and common roads that will be within the influential range of the railroad. And the items in the annual expense are known to be liberal for even a greater tonnage than is stated.

The result, therefore, is that the Hudson and Delaware Railroad will amply sustain itself by its own local resources, and it is therefore unnecessary to enter into any detail to show that its receipts would be immensely beyond our calculations if united with the important works before mentioned. The single article of coal would more than double the weight of transit and swell the receipts in like proportion.

All of which is very respectfully submitted,
JAS. B. SARGENT,
Civil Engineer.

EXTRACTS FROM THE
REPORT

OF WALTER GUINN, ESQ. ENGINEER,
To the President and Directors of the Wilmington and Raleigh Railroad Company.
(Concluded from our last.)

The estimate of the road-way formation falls far beneath the average cost of similar works; while it is believed that the profits will not be excelled by any improvement in the country. For your Railroad, in connexion with the Portsmouth and Roanoke, and the Petersburg Railroad at Weldon; both of which are links in continuous lines of Railway and Steamboat communication to Boston, must become the great thoroughfare between the North and South; for between the Roanoke river and Charleston, or the Charleston, and Hamburg Railroad, a limiting, there were any other communication by Railway contemplated, its greater length and what is a matter of deeper consideration, its greater expense, forbids the idea of rivalry; and places your road almost beyond the reach of competition. So that we may say, in fact, it forms an important if not indeed, the most important link in the great line of intercommunication between the North and the South. Under this view of the subject, it is difficult without the appearance of exaggeration, to estimate the probable revenue.

The travel between Charleston and the Northern cities by steam boats and stages, may be safely computed at sixty thousand. This amount might be greatly swelled by embracing the whole travel from New-Orleans; which we confidently believe will take the route of your Railroad.

But we will say 60,000 Travellers at \$12.50 each, \$750,000 00
To this we may add for the transportation of the mail, 50,000 00
Way passengers and freight on produce and goods, 100,000 00
\$900,000 00

Deduct for the repairs and renewal of the road and steamboats, \$200,000 00
And it leaves a nett revenue of \$700,000 00

Now, although I believe this sum will fall short of the receipts of the first year, yet, lest we should appear too sanguine and to remove all possible objection, we will deduct from the foregoing, twenty-five per cent., which reduces the amount to \$525,000 00, or a dividend of 35 per cent on the estimated cost of the work.

A Railroad which produces 6 per cent. nett in the first years of its operation, is considered good property; for the increase of business which must ensue, always increases the annual profits in a great ratio.

While our estimates exceed this percentage nearly six times, it will be perceived that we have confined ourselves entirely to the amount of the present travel; and this after being taken at a very low estimate, reduced 25 per cent. But in presenting a view of the prospects of the Road, we should anticipate the probable increase of travelling by reason of the increase of the business and population of Charleston; which must ensue from the great and gigantic scheme which she has in contemplation, and which she will no doubt carry into effect to Cincinnati. And in a few years the Railroad to Hamburg, which is now being extended to Athens, will be prolonged southwardly to Columbus; and thence in continuation with the Railroad to Pensacola, complete the line of Railway, and steamboats all the way to New-Orleans. But without any further specification of the various improvements which are in contemplation and begun at the South, suffice it to say, that your Southern termination at Charleston, towards which all these improvements converge, ensures your immediate, continually increasing and never failing sources of revenue; and completely sets all competition by other and similar improvements, at defiance. For all past experience has shown that the travel on routes connecting commercial cities, increases in a ratio, much beyond that of the business or population; and the great lines of travel in all countries led through the commercial towns.

Routes passing through the interior, with a view to divert the travel, must be regarded as experiments running counter to all experience, and of very doubtful success. And I lay it down as an incontrovertible fact, that those works which will prove most profitable, and most conducive to the great and varied interests of the country, may be classified under two heads. Those which connect the commercial cities, and those which lead from the commercial towns by the most direct routes to the interior and western portions of our country.

But your revenue will be greatly swelled from other sources, which we have not taken into the account. All the improvements which are contemplated from the sea-board to the Western part of your State, must cross the line of your Railway; and to whatever point destined, will find it to their interest, to some extent, to pursue it, in order to make selection of the most favorable location. Under this aspect, your Railroad presents itself to the State in a peculiarly interesting point of view. It traverses it nearly through its entire length from North to South, and forms the basis upon which the internal improvement scheme of the Raleigh Convention may be most economically carried out. For, as I

have before intimated the cheapest route from any point on the sea-board to the West, from Beaufort, for instance to the narrows of the Yadkin, will be found on a very direct line West, until it falls into your Railroad; and thence, (in this case) along it to some point South of the Neuse river.

In a military point of view your Railroad, in connexion with the Portsmouth and Roanoke Railroad, and the contemplated Rail-road between Wilmington and Charleston, may be regarded as forming a complete line of defence to the whole sea-board from Norfolk to Charleston; for there is no Railroad in the country, upon which so large a force can be concentrated in a given time; and where, perhaps, there would be a greater probability of its being required. By the Charleston and Hamburg Railroad and its connexions; the Charleston and Cincinnati Railroad; the Roanoke, Danville, and Junction Railroad; the Portsmouth and Petersburg Railroads; and by means of the Railways to the West within your own State, levys for troops on South Carolina, Georgia, Alabama, Louisiana, Mississippi, Tennessee, Kentucky, Illinois, Indiana, Ohio, Virginia, North Carolina, Maryland, &c., may be met from the remote States in a few days, and in a few hours, from the more adjacent States, and any number of troops, may be thrown on the line of your Railway; whence, by lateral roads and Steamboats, (down the numerous navigable streams which the road crosses) in a few hours, or by a march of a day or two, they may occupy any position on this extended coast. And in the transportation of stores and munitions of war, which, under the military head, is a matter of primary importance, it affords a safe avenue; and in time of war, will prove a saving of millions to the Government.*

As a National work, therefore, yours cannot be considered as secondary to any in the country. But one of the most happy results of the Railway system in the Southern country, and which will be imparted by your Railroad to that portion of the State most concerned, is the effect it will have, by the speedy concentration of troops to put down, if not entirely suppress

* Extract from the Report of Mr. Cass, Secretary of War, on National defence.

"The power of transporting troops and munitions of war, has already opened new views upon this subject; and such is the progress and probable extent of the new system of intercommunication, that the time will soon come, when almost any amount of physical force may be thrown, in a few hours, upon any point threatened by an army. Nashville may succor New-Orleans in sixty hours; Cincinnati may aid Charleston on about the same time; Pittsburgh will require but twenty-four hours to relieve Baltimore; and troops from that city, and from Boston, may leave each place in the morning, and meet in New-York in the evening. This wonderful capacity for movement, increases in effect, some of the most important elements of national power. It neutralises one of the great advantages of an assailing force, choosing its point of attack, and possessing the necessary means of reaching it. Detachments liable, under former circumstances, to be cut off in detail, may now be concentrated without delay, and most of the garrisons upon the sea-board may be brought together, and after accomplishing the object of their concentration, be returned to their stations in time to repel any attack meditated against them."

and remove all apprehensions of servile disturbances and insurrections. The speedy transit of the mail, especially between commercial cities, is an object of solicitude with all Governments. Your improvement fully meets this object, and its importance under this head also, cannot fail to attract the attention of the General Government; and also the concentrated concurrent interests of the large cities at the North. And having the effect as we have asserted, your road will have to turn the whole stream of travel between the North and the South, through Charleston, and on the Charleston and Hamburg, and the Charleston and Cincinnati Railroads, she, as well as those interested in these two great improvements, are deeply interested in your success, and will no doubt contribute largely towards it; and the trade and travel it will throw on the Portsmouth and Petersburg Railways, will greatly enhance their profits, and advance the prosperity and wealth of Petersburg, Norfolk, and Portsmouth.

The counties along the line have manifested the interest with which they regard it, by the handsome subscriptions which they have made.

The benefits to Wilmington will be immediately felt in the great increase in the exchange of commodities, which the increased facilities of communicating with a rich back country will afford. And she may be justly proud of the rank to which she will elevate herself, in having projected and carried into effect, an improvement which may be characterised as a great National and State work.

All, which is respectfully

Submitted by,

Gentlemen,

Your obedient servant,

WALTER GWYNN,

Civil Engineer.

Wilmington, Aug. 15, 1836.

FIFTH ANNUAL REPORT OF THE STOCKHOLDERS OF THE WINCHESTER AND POTOMAC RAILROAD COMPANY.

(Concluded from our last.)

While upon this subject, it is due to the general meeting to state the reasons why this actual expenditure has exceeded what was supposed the first estimate so much—a result, which rather unfortunately has befallen most undertakings of the kind. It is admitted that the original estimate of the work was \$300,000, exclusive of motive power. It is equally true that 27 miles of the distance, the subject of fair calculation at the time of its commencement, did not at least exceed its proportionate amount of this sum—say \$5000 a mile for graduation and masonry. The remainder, extending from the approach of the road to the Shenandoah, to its termination on the Potomac, not at that time located, owing to the uncertainty of the route to be pursued, stands thus chargeable with the increased cost of graduation, being at the rate of more than \$12,000 per mile. A good portion of this was prepared for a double set of tracks, in some parts more, most of it was very expensive, from its coming in frequent collision with the bed of the Shenandoah or the rocky bluffs along its margin, or compelled to follow a trace from Island to Island scattered in its channel, where embankment was obtained only from a considerable distance, and much bridging required across the numerous guts which connect the main stream of the river with the channel of the Navigation Company. To avoid covering the ground belonging to the general gov-

ernment with embankment, and to preserve access, between the different parts of property divided by the road as it passes through Harper's Ferry, it was found necessary to construct twelve hundred feet of double track on piles, the materials for which, as well as workmanship, were very expensive, and the solid embankment wide enough to receive four tracks near the abutment of the Baltimore viaduct, raised from materials hauled from the Maryland shore, drew far more heavily upon our funds, than was anticipated by the Board. The price of timber for the superstructure, went generally beyond its first estimated cost, and the amount of land damages paid for the right of way, far exceeded the calculation of the warmest friend of the landed proprietor affected by its location. They are little short of \$40,000, and if to one half of that sum, still leaving a reasonable allowance to meet the original demand expected from that source, there be added more than \$30,000, arising from the unexpected difficulties above referred to, the reflecting stockholder will not be at a loss to account for the apparent miscalculation of the original friend of the improvement. In truth, however, there are but very few works of the kind in the United States, which have not cost much more than ours, constructed at the same time with equal permanency. 15,000 dollars per mile, including the motive power and depots erected will be deemed by the experienced eye, which has examined our railroad, as no extravagant average. And may it not in some degree be attributed to the laudable views of our inland economy, and the too generous confidence we reposed in our neighbors, as to one item of expense at least, if our community may have been surprised at the aggregate cost of the work. Should disappointment, however, have attended the construction of the railroad, and the time it has occupied, this may be said to have disappeared, so far as the success of its operations has been tested. In almost every instance, the trade over it has gone beyond our early calculations. The crop of last year was a short one, and a great portion of it was sent to market before our road was opened. Notwithstanding this, the quantity of flour we have transported up to the 1st of August, a period of little more than four months, is but little under 16,000 barrels. Grain of various kinds, and meal, heretofore almost excluded from market, as will be seen by the exhibit of our trade, have swelled our freight—and many articles, such as pig iron, iron blooms, and a quantity of lead from the borders of Tennessee, with now and then cotton and tobacco, have formed an unexpected addition to our transportation. The receipts from passengers who have passed over the road have also exceeded our first calculation. Although but little provision had been made for the accommodation by stages to the south and west of Winchester, where we think there is much room for competition, and the roads leading to the town have been during the greater part of the season, in a very discouraging state from the frequent rains—the number of passengers has averaged about forty a day since the opening of the road—twice the number calculated in the first report, submitted to our citizens on the subject of a railway from Harper's Ferry.

From the failure of contractors to complete the Northwestern Turnpike, owing, in some measure, to the enhancement of the price of labor and provisions, that important avenue to the West, and destined tributary to our road, has yet yielded us a lim-

ited supply, consisting of passengers from the National Road, who embrace this delightful route through Romney, by a daily line of stages from Cumberland. Energetic steps have been taken to carry into effect the wise provisions of the Legislature to improve this interesting portion of the Commonwealth—and throughout its whole length, our mountain brethren will soon enjoy an outlet to market, which they have long and patiently expected, and travellers be furnished with the most expeditious communication between the Atlantic cities and the centre of the West. But without an improvement in the roads generally leading to the railroad, fertile as our country is, and variously adapted to productions which command the exchange of the seaports, it will only exist in comparative decay to districts naturally its inferior, where neighborhood communications have immediately been opened with enlarged channels of trade. In the upper counties a laudable energy has been displayed in improving the main access to the Winchester market, and below us several modifications of roads leading to our depots are in contemplation. A charter has been obtained to connect Smithfield with a railway lateral to ours; another branch is talked of, and the citizens of Staunton and other towns, forming a chain of enterprising communities through the centre of the Valley, despairing of a turnpike, which some of them preferred, whilst others have believed such an improvement unsuited to the great demands of our country and the spirit of the age, have instituted a survey for the continuation of the railroad from Winchester. This survey, we are informed, now almost completed, has encountered but few difficulties not easily surmounted, and presents no grades, it is believed, worse than those on the Winchester and Potomac Railroad. Recognised as kindred to ours at the first general meeting of the Stockholders in this Company, it ought not now to be considered an alien to our interests; it is bone of our bone, and flesh of our flesh. In this improving age, it will indeed soon become a grave question for the friends of our railroad, well calculated to excite their interest, how long can we retain the trade even of the upper Valley, should the termination of the railroad be fixed here? The citizens of old Virginia, roused to the life and enterprise of their early history, among numerous other efforts, are extending their hand to welcome the commerce of their brethren of the Valley by a railway, penetrating to the Eastern base of the Blue Ridge. Enlightened as this movement ought to be considered, and calculated to stimulate us to generous rivalry, destined though it be to a lucrative union with the line of railways which promise to connect the capitals of the seaboard, it will, when aided by other similar works parallel to it fail to satisfy the demands of the great Mediterranean route of trade and travel, stretching to the borders of Tennessee, and beyond them, the most remarkable country in the Union, whether viewed as to its extent, fertility, mineral resources, its healthy climate, and social and political advantages, indicating it as a prominent federal artery. We cannot allow ourselves to believe that the inhabitants of Winchester have much cause for alarm on account of the proposed extension of the railroad up the Valley. With the start of several years in trade, it would speak but little for the enterprise of our merchants if they could not arrest much of the overflowing commerce which such a channel would discharge. Cities there have been, with no means of

supply inland to cheer the monotonous sterility of their situation on the border of the sea, whence alone they derive their support, whose names have been preserved only in the history of some fortunate neighbor; but there is no instance on record, of any town situated in the heart of a district like ours, blessed with all the elements of social wealth, and in the line of a flourishing trade, having failed to prosper, unless the apathy of its inhabitants tamely relinquish to others the advantages first enjoyed by them. A population such as ours cannot well be deprived of a large share of the commercial benefits arising from an extended improvement of the Valley, while it might well combine with these the prosecution of many branches of manufacturing industry.

Whether the liberal appropriation of the State of Maryland, on behalf of her great works of internal improvement will constrain the Baltimore and Ohio Company, ultimately to prosecute its gigantic undertaking from Harper's Ferry by a route north of the Potomac, we know not; but we hazard little in predicting, that the known forecast of the directors of that company will first ascertain if it be practicable to extend a railroad from Winchester to some point on the upper waters of that river, which might shorten the distance to the Ohio—the great object of their commercial desire. A route which would avoid all collision with their former rival, and would bring them into contact with several fertile valleys watered by branches of the Potomac, and in the vicinity of beds of Anthracite coal, might entitle it to an examination; for although the intermediate country is generally hilly, it is penetrated by remarkable passes, such as are not to be found out of the basin of the Potomac on its north side. Independently of its locality, however, and adaptation to prospective extension, the Winchester Railroad holds out immediate and positive benefit to our country and early remuneration to the stockholders. The receipts of the company up to the 1st inst. a period of little more than four months, have amounted to \$16,656.87; and had they been charged only with the expenses proper to transportation and incidental repairs together amounting to about \$5000, a net profit might have been divided among the stockholders of more than six per cent. per annum. The obligation resting upon the company previous to the opening of the road, and the heavy demands on account of a portion of it not yet entirely finished at the Ferry, compelled the Board to divert all the available proceeds, from what might appear to some of the stockholders their legitimate object, namely, distribution among them in the shape of a dividend.

Much of the stock has remained for a considerable time dormant, but to attempt to render it productive by a recourse to temporary bank facilities, appeared to the Directors, and it is thought the reflecting stockholders will agree with them, a policy of very questionable propriety. The payment of the debt is the appreciation of the stock of any company, and although that desirable object is best attained by making a dividend, it would appear to be a forced and injudicious mode of finance to do so, until the floating debts of the company were paid, or converted into a loan of some permanency. The latter arrangement it is thought can easily be made, when the character and prospects of the work are somewhat established, and its ability to meet its current demands and pay with promptitude interest upon its bonds, is beyond all doubt.

This condition, it is confidently believed the company has now attained—few claims yet remain on account of actual construction of any part of the road, and the repairs incident to the first effect of transportation will soon be completed. The entire debt of the company including the convertible loan of \$150,000 authorized by the Legislature amount to a little upwards of \$171,000.—That portion of this sum consisting of temporary loans from Banks, if changed into a loan for a term of years, would, it is thought, give more animation to our stock, now a little under par, and would tend to equalize the claims upon the present stockholders, with those who may succeed them, and enable the company to make a dividend in February next, unless the failure of this year's crop should defeat their calculations. This course the stockholders will most likely sanction.

In the accompanying documents, relative to the receipts and disbursements of the company generally, are exhibited the aggregate amount of expenditures, since the first survey was instituted—stated at \$586,926.48. In this sum is included the purchase money of some valuable improved property at Harper's Ferry, and the grounds adjacent to the depot at Winchester embracing about seven acres—the interest upon money borrowed to relieve the stockholders, and expedite the construction of the road, which with other items, not justly chargeable to its expense, would reduce the actual disbursements on account of the road and present appurtenances to less than \$480,000. In the document which shows the particular items of expenditure, up to the same date, some causes of disbursement may appear high—their acknowledged importance, however, will we think satisfy the liberal investigation of the stockholders. Others there are, we feel assured, which will meet the views of a rigid economy, and in pronouncing upon their merits generally, it might be well to institute a comparison between the condition and cost of our road and other similar works elsewhere—the means for which are within the reach of almost every stockholder. Such is the state of the undertaking, which has drawn so largely upon our interests and exertions. At first conceived far beyond the resources of our community, it has nevertheless been accomplished. Many difficulties have occurred in its prosecution, which its most calculating friends did not foresee, but they have been surmounted. Some of its early opponents have been agreeably disappointed by its results, while, with regret, we count many of its warmest supporters, whom Providence has not permitted to witness the consummation of their enlightened exertions. It has had its days of excitement, of gloom, and of triumph.—A variety of opposing interests have sometimes assailed it with threatening effect, but it now stands erect. Its promised benefits have appeared long in coming, but they will steadily advance, and be sure, for they will flow through a thousand channels yet unopened. And when the toil and disappointment, and party bickerings which attend the first stages of such a work are forgotten, it will grow in favor, and every part of Western Virginia feel its raving influence.

Mr. Sherrard, from the Committee on Finance, made the following Report:

The Committee of Finance respectfully ask leave to submit the following report, showing the receipts and disbursements of the Company for the fiscal year ending the 15th of July, 1836:

On the 15th day of July, 1835, there was in the hands of the Treasurer, to the credit of the Company—

In cash,	\$3,577 44
In bonds for stock and loans,	2,025 91
Interest on these bonds,	239 73
	<u>\$5,843 08</u>

The receipts and disbursements of the Company between that time and the 15th of July, 1836, are shown by the following statements:

RECEIPTS.

From stockholders, (being the whole amount due from the subscriptions of individual stockholders,)	\$33,106 33
From the Board of Public works, balance of State subscription,	20,000 00
From J. I. Cohen, Jr. and Brothers, of Baltimore, on loan,	20,000 00
From Thomas Biddle and Co. of Philadelphia, on loan,	49,971 67
From proceeds of discounts from the Banks in Winchester,	14,345 31
From the Baltimore and Ohio Railroad Company, to reimburse the amount advanced in constructing the southern abutment of the Potomac viaduct at Harper's Ferry,	10,161 02
For principal and interest on bonds for stock and money loaned,	2,525 06
For costs and interest,	76 28
For amount overpaid M. Scholfield on timber contract, and refunded by him,	1 35
For amount overpaid for discounts in Mechanics' Bank of Baltimore, refunded,	3 33
For amount paid to Treasurer by receiving and forwarding agents, on account of transportation of passengers and tonnage,	8,371 12
For amount received by receiving and forwarding agents on same account, and disbursed by them for the use of the Company,	4,555 09

Making the total amount of receipts by the Company, for transportation of passengers and tonnage, from the opening of the road, (14th March,) to first of July, 1836, that being the time to which the accounts are made up,

12,926 21

Total amount of receipts for the year ending July 15, 1836, with the exception of the amount received for transportation of passengers and tonnage between the 1st and 15th of July, an account of which has not yet been rendered by the agents,

163,116 59

To which add the amount of the balance of cash in the Treasurer's hands to the credit of the Company, on the 15th of July, 1835,

3,577 44

And it makes the whole amount received during the past fiscal year including the balance in the Treasurer's hands at the close of the preceding year, \$166,694 03

DISBURSEMENTS.

Amount disbursed by the Treasurer from the 15th July, 1835, to 15th July, 1836, inclusive, \$162,037 17

Amount disbursed by the receiving and forwarding agents from the opening of the road up to the 1st of July, 1836, 4,555 09

Making the total amount of disbursements, \$165,592 26

Which, being deducted from the receipts, leaves in the Treasurer's hands, on the 15th of July, 1836, a balance to the credit of the Company of \$101 77

To which add the balance of bonds in his hands at that time uncollected, 941 85

Interest on bonds to same time, 3 44

Leaves the total balance in the Treasurer's hands, on the 15th of July, 1836, to be carried to the credit of the Company for the ensuing year, \$1,047 06

The committee have carefully examined the warrants and vouchers, upon which the various items of disbursement, comprehended in the foregoing general statement, have been made, and find them all in proper form, and duly authenticated, in the manner prescribed for that purpose.

Without a word of explanation from the committee in regard to the aggregate amount of receipts and expenditures as stated above, the stockholders would be misled as to the actual expenses of the company. The sum of \$7024 50 should be deducted from the accounts of receipts and disbursements respectively. That amount was borrowed from one of the Banks in Winchester, and was of course credited to the Company in the Treasurer's account of receipts; and when the debt thus created was afterwards paid off, it was charged to the account of disbursements. This amount being deducted, the receipts of the year would be reduced to \$159,569 53, and the disbursements to \$159,567 76, without affecting the balance to the Company's credit in the hands of the Treasurer, at the close of the year, which would stand as above stated, at \$1047 03.

The committee might here close their report, but as the work, with the management of which, they have been charged, in common with their colleagues of the Board of Directors, for the past year, is now rapidly drawing to a close, it will not be thought out of place, perhaps, to state, so that it may be seen at a single glance, the liabilities of the Company and its disbursements in the execution of the work, so far as the same have been ascertained.

Its ascertained liabilities are—
To the stockholders, for capital stock \$300,000 00

To banks and individuals, for money loaned for the use of the Company, 171,500 00

To the stockholders, for balance in the Treasurer's hands, 1,047 06

To do. for receipts for passengers and tonnage, 12,926 21

485,473 27

Its disbursements to 15th July, are, 486,926 48

Leaving an apparent excess of disbursements over receipts of \$1,453 21

This apparent anomaly of the disbursements of the company exceeding its receipts, will be explained at once, by recurring to the fact, that whilst the account of disbursements is brought down to the 15th of July, the account of the receipts of the receiving and forwarding agents is only rendered to the first of the same month, although the money received by them since that time has been in part placed to the credit of the company in Bank and appropriated to meet demands upon it.

The phrase "ascertained liabilities" employed by the committee in the foregoing statement, is designed to refer to its actual existing liabilities, as distinguished from such as are yet unascertained, or unprovided for, such as land damages in cases where the amount is not yet determined, out-standing demands upon the company which remain to be adjusted; and, in short, all expenses which have been incurred, but for which the accounts have not been presented and paid.

The committee believing that it would not be unacceptable to the stockholders to be put in possession of the amount of the disbursements of the company, from the commencement of the survey made by Capt. Graham and his corps of engineers, up to the close of the last fiscal year, on the 15th July, 1836, have caused a statement to be prepared by the clerk of the board, which accompanies this report, showing as well the total amount of disbursements up to that period, as the several heads under which they were made. They will only add, that if any stockholder should think the information thus furnished not sufficiently minute, it will give the committee great pleasure to supply the deficiency by producing the books of the company and submitting them to his inspection.

J. H. SHERRARD,
J. SENSENEY.

August 5, 1836.

EXPENDITURES BY THE WINCHESTER AND POTOMAC RAILROAD COMPANY, FROM THE COMMENCEMENT OF ITS OPERATIONS TO THE 15TH OF JULY, 1836.

Expenses of surveying by Capt. Graham and his corps,	\$1,123 33
Expenses of printing,	535 00
Expenses for books and stationery,	197 04
Expenses for Depot at Harper's Ferry,	1,087 37
Office expenses,	12 50
Postage account,	116 84
Expenses of location and engineering, viz:	
Salaries of engineer and assistants,	19,100 56
*Other expenses,	7,339 77
	26,440 33
Salaries of President and other officers,	3,900 00
Office rent,	210 00
Real estate at Winchester and Harper's Ferry,	4,411 00
Law expenses,	451 25
Expenses of constructing bridges,	4,033 33

*In this item is included the expense of mathematical instruments, horses, chain carriers, office rent for engineers, fuel, stationery, board of hands, &c., &c.

† This item does not show the whole expense of constructing bridges—it shows only the cost of bridges under separate contracts. Where bridges were made by contractors for sections of the road where bridges are situated, the engineer made no

Land damages,	86,300 41
Expenses for Depot at Winchester,	7,185 85
* Do. for motive power,	3,097 91
† Do. for superstructure,	114,514 99
Interest on loans,	7,296 07
Expenses of graduation and masonry,	199,499 52
Do. of transportation,	2,061 82
Do. for timber,	72,913 79
Taxes,	1 42
Contingent expenses,	1,613 17
	\$486,926 47

STATEMENT OF TRANSPORTATION AND TONNAGE UPON THE WINCHESTER AND POTOMAC RAILROAD, FROM THE 14TH OF MARCH TO THE 31ST JULY, INCLUSIVE.

TRANSPORTATION UPON THE ROAD.

DOWNWARDS.

15,771½ barrels of Flour,	
11,456 bushels of Grain,	
2,379 bushels of Meal,	
97 T. 15C. 3qrs. 19lbs. of Iron,	
60 T. 19C. 1qr. 5lbs. of Lead,	
257 T. 10C. 1qr. 4lbs. of other Merchandise,	

UPWARDS.

262 T. 3C. 1qr. 5lbs. of Plaster,	
2,923½ barrels of Fish,	
2,675 bushels of Salt,	
1,340 T. 10C. 3qrs. 10lbs. of other Merchandise,	

PASSENGERS.

	No.	Amt. Fare.
March, Down,	212	
Up,	224	
	436	\$612 45
April, Down,	489	
Up,	570	
	1059	3,458 66
May, Down,	573	
Up,	634	
	1207	1,613 71
June, Down,	501	
Up,	586	
	1087	1,411 85
July, Down,	736	
Up,	812	
	1548	1,969 51
Total,	5337	\$7,996 18

AMOUNT RECEIVED FOR TONNAGE.

March, At Winchester,	\$430 85
At Harper's Ferry,	299 48
	\$730 33
April, At Winchester,	1,900 44
At Harper's F.,	1,156 64
	3,057 08
May, At Winchester,	1,768 65
At Harper's F.,	1,188 93
	2,957 58
June, At Winchester,	606 88
At Harper's F.,	420 37
At Thompson's,	21 21
	1,054 56

distinction in his drafts, but included all in graduation and masonry. This item includes, indeed, only the wood work, generally, of bridges.

* This item only includes passenger and burthen cars. See next note.

† In this item is included 53,000 dollars, paid for bills of exchange remitted to England to purchase iron, locomotives wheels and mountings for cars, spikes, &c. Not having received the full statement of those purchases, the whole amount of that remittance stands charged to expenses of superstructure.

LEMUEL BENT, Clerk.

Win. and Pot. R. R. Office, Aug. 2, 1836

July, At Winchester, 675 92
At Harper's F., 1,035 23
1,761 15
\$9,560 70

RECAPITULATION.

Revenue from March 14 to July 31, 1836.
From 5337 passengers, \$7,093 13
Tonnage, 9,560 70
\$16,656 88
LEMUEL BENT, Clerk.

NOTE.—The above statements embrace the month of July, which is not included in the report of the Committee of Finance.

From the Utica Observer.

You have doubtless observed in the Albany Argus of the 30th ult. the proceedings of the Canal Board and of the Canal Commissioners, at their late sessions in Albany. It appears the work of enlarging and improving the Erie Canal is to be commenced in good earnest. It is with great pleasure we observe the determination of the Canal Board to improve the canal by allowing a new location at the Cohoes Falls, by which the great inconvenience of the shoal levels in the present navigation will be materially remedied. It will be recollected the law authorizing this improvement gives the Canal Board authority to change the present line in all cases where they may deem an alteration desirable to improve the present navigation, except through cities and villages, where they are not at liberty to abandon the present line. This confers a responsible and highly necessary power. It would be vain to deny that the present Erie Canal has material errors in location, and is defective in construction.—This has arose from the limited experience that was had at the infant age in our canal history, that existed in the commencement and prosecution of this great work—together with the effort to accomplish a great work with inadequate means; and we must not be supposed as casting the least reflection on the men who made the most of the circumstances that surrounded them, in the prosecution of an enterprise that was viewed by a large portion of our intelligent and influential citizens, as of doubtful utility if not a disastrous expenditure. We hope, therefore, and from what we see at the commencement of their operations, believe the Canal Board will view this matter in the broad and liberal light which the importance of the navigation demands; and apply the correction by amending locations that universally embarrass the navigation by its abrupt curves, and expose it to delay from floods, which are allowed to pour in, not only a redundancy of waters, but of mud and small gravel. A canal should not be affected by floods or drouths. This is indeed one of its most important points of superiority over river navigations; and in a navigation of such immense importance as the Erie Canal, no reasonable expense should certainly be spared to render it, with all its appurtenant works, least liable to the contingency of interruption.

It is not to be supposed that the eye of the observer, in travelling along the canal, will always be correct in its views of alteration that general appearances may suggest; but these may be determined by instrumental examination, which we trust will be applied with a skilful zeal, to do all that the great object so clearly demands.—It would indeed be mortifying to see a perpetuation of errors that experience and

more full examination has rendered palpable, and which there is ample means to correct.

On the 22d of August next a portion of this great work, amounting to a million and a quarter of dollars, is to be put under contract. It will be the commencement of a canal 7 feet deep and 70 feet wide, extending 363 miles through the heart of the State; and who will undertake to portray its importance to the favored interior through which its advantages will be felt? That it will render our transportation to and from the Atlantic market 50 per cent. off the present cost, appears to be generally conceded by practical navigators. It will render trans-shipment between our cities and villages on its banks, and the Atlantic market no longer necessary. It will open a grand avenue to our neighbors of the upper lakes, and exhibit to the world an unparalleled artificial navigation.

While we are desirous of seeing this work well done, we have no wish to advise expenditure for mere display. The form most convenient for and the stability that will in the highest degree secure an uninterrupted navigation, will best accord with the great object to be accomplished.

Though not as remotely situated from market as our more western counties, still to our own county this improvement is of invaluable importance. Our heavy agricultural products will be greatly increased in value by the great reduction that will be effected in transportation. Our situation will be almost on the banks of the Hudson. Vessels carrying from 100 to 130 tons may start from the docks of our own cities and villages, and proceed without breaking bulk to the Atlantic market. Our merchants will put their goods on the same vessels lying at the New-York docks, and no breaking bulk will disturb them until their arrival at their destination. Our agricultural and manufacturing enterprise will receive a new impulse, giving freshness to the growth and importance of our central position.

ONEIDA.

From the Repertory of Inventions.

PROGRESS OF SCIENCE APPLIED TO THE ARTS AND MANUFACTURES, TO COMMERCE, AND TO AGRICULTURE.

ON THE THEORY OF GRADIENTS ON RAILWAYS. BY W. S. B. WOOLHOUSE. —Mr. Woolhouse has addressed the following letter, dated February 20, 1836, to the Editors of the London and Edinburgh Philosophical Magazine, in reference to the papers of Dr. Lardner and Mr. Peter Barlow, which we transferred, from that work, to the "Progress of Science" in our number for March last.

As Dr. Lardner and Mr. Barlow hold out conflicting opinions on the theory of gradients on railways, and have left the subject in a state more calculated to create doubts in the minds of the less informed of your readers than to lead them towards the formation of settled conclusions, perhaps you will favor me with the insertion of a few words, by way of explanation, as far as the philosophy of the question presents itself to my mind. Mr. Barlow, without absolutely saying which of the two solutions is wrong, though probably quite conclusive in his own view of the matter, first states his objection to the arithmetical results of the formula employed by Dr. Lardner for

the velocity, in certain cases, then gives an outline of his principle of investigation, and finally expresses himself "quite content to leave the decision to those whose minds have not already received a bias from preconceived notions of the forces." Whatever sentiments may prevail as to the competency of my opinions on such a subject, it will at least be acknowledged that I possess the qualification of being free from the bias here alluded to, and I am induced to hope that your readers will, on this very ground acquit me of any imaginable interference in this undertaking, voluntarily, the examination of a point that has already had the attention of such distinguished individuals. By close and continued application of particular opinions to particular subjects, it is indeed surprising how they fix themselves in the mind, and become ultimately, whether true or false, of almost a fundamental character. But I do not consider this observation to be applicable to the present case. It is my wish to simply and expose the truth as far as I can perceive it. I do not, however, intrude the present remarks in elucidation of the subject without some degree of hesitation, although quite free from apprehension as to their theoretical soundness. To many of your readers, who must be far from satisfied with the present situation of the question, I nevertheless feel myself justified in submitting them.

According to Dr. Lardner, the subject is "totally distinct from the consideration of accelerating forces;" he considers it to be essential that the velocities be continued uniform, and therefore discards every thing in the shape of an accelerating force.—Now, in order that such a theory may be sustained, it is a well known elementary principle of forces, that the power employed must be always precisely equal to the resistance, or the amount of friction combined with the proper resolved effect of gravity along the railway, observing, however, that in the term friction, we must include the resistance to the motion experienced by the carriages, &c., in passing through the atmosphere. We shall not here discuss the practicability of preserving this exact balance between the forces at the various changes of inclination; nor shall we offer any serious objection to the principle that the friction is the same for all velocities, which has received the sanction of general practice, though doubtless inaccurate, as far as regards the effect of the atmosphere.

Continuing the notation of the preceding letters, we have t , for the moving power that will keep the load moving at a uniform speed, V , along the level plane; $t + \sin \epsilon$ for the moving power to keep the load moving at the same uniform speed up the inclined plane: and $t - \sin \epsilon$ for the moving power to sustain the same uniform speed down the inclined plane. To the truth of this there cannot be any doubt, if we assume, as Dr. Lardner has done, that the friction t is not altered by the slight inclination of the plane. By following Dr. Lardner's reasoning, we are hence fairly led to the result that the same amount of mechanical force will be expended in ascending and descending the inclined plane, as in draw-

ing the same load backwards and forwards along the level plane of the same length L.

Though Dr. Lardner is certainly justified in stating this conclusion to be a plain result of first principles, it should, at the same time, be remembered, that it rests solely on the hypothesis that the power in each case is to be precisely adapted to the amount of resistance, so as to preserve throughout the same uniform velocity V.—This hypothesis has not been admitted by Mr. Barlow, and it must necessarily fail in determining the effect produced by the deflection of a rail during the transitory passage of the carriages. In this way, it appears to me that the principle advocated by Dr. Lardner, carries with it a restriction that entirely unfits it for an objection to what has been advanced by Mr. Barlow, in his second Report, addressed to the Directors of the London and Birmingham Railway Company. On the other hand, "however, I can only come to Mr. Barlow's conclusion, that it is altogether erroneous, both in theory and practice," when the assumed maintenance of uniform motion is objectionable, as it most certainly is, in the case of the deflections of rails. Contenting myself at present then, with the opinion that the contending parties thus view the question of power expended, on different suppositions as to the way in which it is applied, I shall just take a very brief sketch of the question of velocity, when the motion is not assumed to continue the same through planes of different inclination.

Dr. Lardner supposes that in cases of uniform velocity, the resistance into the velocity is constant, and on this assumption deduces the equations stated by Mr. Barlow in (Repertory, March 1836) page 181, viz:

$$(t - \sin \epsilon) v = t V \quad v = \frac{t V}{t - \sin \epsilon}$$

This assumed principle is, in my opinion, decidedly inaccurate, more especially, when it is contemplated that the carriages will pass along with the uniform velocity so expressed. For uniform motion can only be continued when the moving force continues equal to the resistance; and assuming with Dr. Lardner, that the amount of friction is independent of the velocity, the speed will in such a case be quite indeterminate, or, in other words, the power so applied will sustain uniformly, any velocity that may have been previously communicated. If the friction were really independent of the velocity, while a moving force which exactly balances the resistance would maintain uniformly any previously imparted motion, a moving force which exceeded the resistance would transmit the carriages with a velocity continually accelerated, in conformity with what has been said by Mr. Barlow: but as the portion of resistance arising from the atmosphere at least increases with the velocity, it is evident that the resistance will gradually augment till it balances the moving force, and so a uniform motion will eventually succeed. If the carriages be so acted upon as to retain a uniform velocity v along a level plane, and with such velocity and moving power they arrive

at the upper end of, and proceed down, an inclined plane, the investigation given by Mr. Barlow (London and Edinb. Phil. Mag. vol. viii), pages 98—100, will be strictly accurate on two suppositions, viz., 1, That the friction is independent of the velocity and inclination of the plane. 2. That the action of the moving power is not diminished by the increase of velocity.—The former supposition is sanctioned by Dr. Lardner; the latter, as Mr. Barlow justly observes, if not true, will have the effect of giving the velocity and space passed over, rather in excess of the truth, and therefore the more favorable for a comparison with Dr. Lardner's velocities, which are so much in excess. There can be no doubt as to the inaccuracy of the preceding formula, from which the last mentioned velocities are calculated, as the principle from which it is derived is not founded in theory.

PRODUCTION OF SILK.—Raw silk is raised in and manufactured in four provinces of China; namely Kiang-nan, Fokien, Tche-kiang, and Quang-tung. It is to be observed of this commodity, and indeed of most others in the production of which skillful industry is required, that the supply from the provinces beyond the tropic is much superior in quality to what is obtained from those within it. The silks brought to the market of Canton are those of Kiang-nan or Nan-king, and of Quang-tung only; and the first is generally double the value of the last. There is no article which shows in a manner more remarkable than this the capacity of extended production possessed by China. In the fifteen years ending with 1823-24, the average exports of the East India Company (and they were the sole exporters) were barely 94,000 pounds weight, and in the last named year they were short of 80,000 pounds,—amounts which were supposed to express the whole disposable produce of the empire. In 1834, however, the trade having been above ten years in private hands, and the article brought to Europe through the medium of Singapore, the exports rose to 1,522,666 lbs. being an increase of between sixteen and seventeen fold. It is to be remarked, that this augmentation in the export has produced no sensible advance in the Chinese price of the article. The quantities here stated refer only to exports to England; but these form by far the most considerable part.—Edinburgh Cabinet Library, Historical and Descriptive account of China, Vol. 3.

ASTRONOMY.—The Chinese annals give a singular example of the importance attached, in the year 31 B. C., to an eclipse which had not been predicted. It produced such terror, that the emperor secluded himself five days to examine into his conduct and that of his administration! Afterwards he published an edict to the following effect: "The appearance of the sun and moon has turned our attention to ourselves. It is necessary that we follow a better course, and thereby avert the evils with which the heavens threaten us. For myself, I can scarcely speak; I tremble at the sight of my errors; I wish that the dignitaries of my court would give me their advice in sealed writings, and I do not wish that any one should give me the title of *Ching*." His courtiers complied with the command.

Gaubil has given the answer of Thing-king, which was, that according to the rules of astronomy, eclipses ought never to appear but on the first day of the moon; though of late years, several have happened on the last day. The reason is, the moon has accelerated its motion, and by that the time of the eclipse is anticipated. *The sun is the image of the sovereign, the moon the image of the subjects. The imperfections of the latter have usually their source in those of the former.* This shows what a powerful instrument superstition is; though it has seldom been applied to so useful a purpose as the reformation of a government.—Edinburgh Cabinet Library, Historical and Descriptive Account of China, Vol. 3.

FIRST YEAR OF FREE TRADE WITH CHINA.—There are residing at Canton upwards of a hundred European and India merchants; consisting of British, American, French, Dutch, Danish, Swedish, Spanish, and Portuguese, with Parsees, and Mahomedans, mostly from Bombay and Surat. The principal mercantile firms consist of eight British establishments, seven American, and one joint French and Dutch. The resident merchants, of course, are thoroughly acquainted with the trade, and are all men of business, activity, intelligence, and great integrity. With their assistance the first year of free traffic has passed over most favorably, and in such a manner as to contradict almost every assertion of the opponents of an open intercourse with the Chinese.—Upwards of 80,000 tons of shipping have cleared out for England, for the most part with European crews; yet there has been no example of any quarrel between the sailors and the natives. Instead of a scarcity and inferior quality of tea, as predicted, there have been exported for this country upwards of 43,000,000 of pounds, being 12,000,000 lbs., or nearly forty per cent. more than the average annual exports of the East India Company; and the article has been at least of equal quality, and much fresher than any tea ever furnished under the monopoly system. Under the rated duties at present exacted, an augmentation of the tea consumed has already taken place, to the amount, we believe, of about ten millions of pounds, raising the annual consumption of the kingdom from thirty to forty millions. The public revenue has gained in proportion; and, instead of an average of three millions five hundred thousand pounds per annum, we may henceforth calculate that the tea duties will not fall short of five millions; and indeed it may be expected that tea will yield the largest revenue of any one article of our consumption. To ensure this result, however, it will be indispensably necessary that the duty upon it should not exceed that on the corresponding articles of coffee and cocoa; reckoning the rate on both, not by quantity but by value, which would imply the necessity of a great reduction as applicable to tea.—Edinburgh Cabinet Library, Historical and Descriptive Account of China, Vol. 3.

MORE RAILROADS.—A delegate convention recently assembled at Northampton, (Mass.,) and adopted a resolution recommending an immediate survey of a railroad from Hartford to the North line of Vermont, through the valleys of the Connecticut and Assumpsit Rivers.

AGRICULTURE, &c.

From the Farmer's Register.

ON THE NATURE, FORMATION, PROPERTIES
AND PRODUCTIONS OF ARGILLACEOUS
SOIL.

BY M. PUVIS.

Translated for the Farmer's Register, from the *Annales de l'Agriculture Française*.

EDITORIAL REMARKS.

It is but little more than twelve months since we first met with one of M. Puv's publications—which one (the Essay on Lime) was the latest which he had then sent to the press. Since, we have devoted many pages of the Farmer's Register to translations from that and other of his pieces, some of which were of much earlier date, but which did not come under our view, and probably had never reached this country, until brought by our special order, and in consequence of the high opinion formed of the author's later writings, which had been seen in the last numbers of the *Annales*. In presenting these several pieces, it is hoped and believed that we have both gratified and informed thousands of readers. (through various re-publications that have been made,) and have done much to diffuse the knowledge of the value of lime as manure, and to encourage and promote its extensive application. While we have heretofore frankly stated some strong objections both to the matter and the manner of M. Puv's different essays, we think that all of them are interesting to investigators of the nature of soils, and the action of calcareous manures, and highly valuable to those who are but little informed on those subjects, and are seeking all the instruction that they need to direct their practice. As to the main and most important opinions of M. Puv, we could not do otherwise than approve them—for it is remarkable how closely they agree with our own, first advanced and maintained (so far as was then known,) in the Essay on Calcareous Manures. The two writers separated by the ocean, and ignorant of each other's labors, and even existence, were during the same course of time engaged in investigating the same class of subjects, and arrived (though often by different proofs, or trains of reasoning,) to the same results. The entire deficiency of calcareous earth in natural poor soils—the certainty of improving such soils by its application—and the impossibility of enriching them profitably without—the acidity of such soils—the effect of liming or marling a country to lessen or remove malaria, and its consequence, autumnal diseases—all these views are maintained by both writers—and each maintained what he then thought was as novel and unsupported by other testimony, as it was important to be made known.

The following piece of M. Puv, though the latest to reach us, in fact preceded most of what we have heretofore had translated; and this piece, it seems, is but an abstract or new form of an earlier publication, which has not yet been seen. But though our reading and publishing of the several articles has thus been in nearly a reversed order to that of their original appearance, the injury thereby sustained has not been considerable owing to a peculiarity in the manner or

form of all these several publications, which is in general a great fault, but which in this case, (and very often in other agricultural writings,) is of much use to readers, however offensive to the critic's eye. It is the repeating, in different kindred articles, the same descriptions or opinions whenever the same subjects come under view. Thus the peculiar qualities of the "argilo-silicious" soils, which are the subject of the following article, have been described in the Essay on Lime, and elsewhere, with sufficient distinctness to enable us to know them. Our inferences in regard to them were stated in a note to the Essay on Lime, (page 363, vol. III, Far. Reg.) and this entire article shows that those inferences were correct.—In fact, if M. Puv had been investigating the nature, and treating of the improvement, of the "ridge" lands of lower Virginia, he could not have more correctly described them, than he has done in describing soils in France. The dividing ridge or level between every two rivers, or tributary streams, in lower Virginia, is precisely like the "argilo-silicieux plateaux" of M. Puv: remarkable for the same general features of sterility—deficiency of calcareous earth—peculiar fitness for calcareous manures—for being more or less subject to sickness in autumn. As examples exhibited are more impressive than general description, it may be observed, that the stiffest kind of M. Puv's "argilo-silicious" soil, (precisely the soil of "triste Sologne"—) is presented in the body of land in Prince George county, which lies between Powell's Creek and Ward's Creek, both flowing into James River: that most of the neighboring level ridge lands between other streams, (and through which the mail road passes) are examples of the medium texture: and that below, in Surry, the ridges are more sandy, indeed very light, yet still exhibiting the same general qualities.—Every county in lower Virginia (if not elsewhere) will furnish abundant specimens of all these varieties of texture.—Though varying greatly as to the predominance of sand or clay, there is, throughout, the same general character. We were, long ago, forcibly struck with this very uniform character of a great extent of our country, (as described concisely in Essay on Cal. Man. p. 40, 2d Ed.) and thence supposed that there has been a similarity of geological formation, different from that of the lower and more fertile lands intersecting this sterile region, and different from that of any other region ever heard of, until we recently met with the writings of M. Puv, and his description of precisely similar lands in France. We are rejoiced to be enabled to call his support to the aid of improvement in Virginia and other Atlantic States: for all that he says, in this article, is as applicable to our country as to France. Whether his geological views are plausible or not, we are not qualified to decide: but at any rate, they, and the facts by which they are supported, are curious and interesting.

The classification of soils by writers on agriculture seem to have been hitherto of little utility. Till now they have aimed to class them by means of their texture, or dif-

ferent degrees of consistency; and this method has brought together soils different in nature, properties and composition.—Hence it has resulted that the classification, instead of simplifying matters has only rendered them more complicated; and in this instance, as in some others, science, by a classification at variance with nature, has retarded, rather than advanced practice, and has introduced a vexatious confusion into agricultural works and theories. This serious inconvenience would not have occurred if lessons had been taken from practice in this question. Every where experience has taught the husbandman to divide the soil into two classes, distinct in their nature, their composition, their properties and productions: it is this unscientific (*empirique*) classification which should have been followed; and then we should not have been lost among the English "loams" of which we cannot ascertain the exact quality, nor the "free lands," (*terres franches*), nor "fat clays;" (*luts gras*), of our French writers, which also occasion misinterpretations in each country.

The great author of all things, in his supreme wisdom has fortunately varied the comparison of soils but little. Among the vast multitude of simple substance of which the globe is composed, he has scarcely admitted more than three to form its surface—that part destined to support its inhabitants: these substances are silex, alumine, and lime. A greater number of component parts, by diversifying the nature of the soil, would have made agriculture much more complicated—and it is already, in the actual state of things, so difficult an art! If it had been necessary to practice husbandry upon a soil composed of numerous elements, it would have been almost entirely above human intelligence.

Among these three earths, the two first, silex and alumine, form almost the whole mass of the upper stratum, and exclusively compose more than half of it. The silex is found in the form of sand, and the alumine is scarcely ever met with alone, but it exists in the soil under the name of argil [pure clay] clay, always mixed or rather combined with particles of silex very minutely reduced.

When lime, or rather the carbonate of lime, is found mixed in a greater or less proportion with the two first earths, it modifies their nature in whatever quantity it may be found mixed with them: the compound then takes the name of calcareous soil, and its properties are changed in a remarkable manner.

Sometimes the lime is mixed with a little magnesia, which then changes all the characters of the calcareous soil and most frequently renders it barren.

With these three principal constituents there is found mixed more or less of vegetable mould, (*humus*), the decomposed remnants of preceding vegetation, or additions made by man to increase fertility; and, finally, a small portion of oxide of iron is very often met with, which does not seem to act an important part of vegetation.

Practical agriculture has learned in each country to divide the soil into *silicious*, and

*calcareous lands.** In Ain, Saone-et-Loire, and Jura, and in a great part of France, the argilo-silicious land, (*terre argilo-silicieuse*) bears the name of *terre blanche* and the calcareous lands receive names which distinguish them from it completely; in the south the argilo-siliceous lands are called *boulbeuses*, and the calcareous lands *terres fortes*, in Yonne they are distinguished as *terre de puisage* and *fortes terres*, in Aveyron the one has the name of *segallas*, and the other that of *cassues*; in Berry and the Gatinais the first is called *terres de Sologne*, in Belgium and the north it is called *terres a bois*, *terres elytres*. In fine, practice has every where given a distinguishing name to this nature of soils, which every where offers the same composition, the same properties, the same productions and the same difficulties in its cultivation.

It is this classification, this distinction of practice that I propose to examine particularly. So long ago as 1811, struck with these two great natural and practical divisions, I published a memoir on this subject. Since then I have felt more and more the great necessity of it, and my present work, which is the study of the first class of soil, of the soils composed of silex and argil will be, in some sort, a development of facts in support of my work of 1811. Hereafter we shall be able to return to the study of calcareous soils.

Our subject will lead us to some details of agricultural geology, a science yet in its birth, for which as we proceed, we shall collect some materials.

I. The soil of which we are going to speak is not to be confounded with the granite or schistous soils which cover the most elevated parts of the globe. These last soils offer indeed an analogy of composition and productions with the former; they are also composed of alumine and silex—but they abound in granitic or schistous fragments of various magnitudes, which are not met with in like manner in the argilo-silicious *plateaux*; they produce, as these last, the heath and broom, but the fern does not grow abundantly on them.—Their formation is not the same, the exterior characteristics and the sub-soils are different; the granitic or schistous soils seem to have been owing to decompositions of granite or schist on the same spots by meteoric influence; at other times they have been produced by the movement of partial waters in the interior basins.

The argilo-silicious soil, on the contrary, belongs, as we shall see hereafter, to a great deposit which seems to have been general; but which, however, did not rise to great heights. It covers, in France and elsewhere, vast extents, and it composes at least three fourths of our forest lands in the plains; the great forests in the neighborhood of Paris and those of Normandy are almost entirely composed of it. It is the only great shade of soil which is produced every where with striking analogies

in its soil, its sub-soil, its properties, its advantages and its defects; while other natures of soil offer great disparities among themselves in the different positions in which they occur.

Its composition, in the first place, as we have previously announced, is completely identical, but it varies much in consistence, and in the faculty of retaining water, according to the greater or less quantity of clay which it contains, and as the silicious sand found in it is in a state of more or less minute division; for the experiments of Thaer, Schubler, and Cadet Gaussicourt, have proved that the stiffness of a soil and its *impermeability* (impenetrability to water) depend on the minuteness of division of the silex, as well as on the proportion of clay that it contains. Silex in the form of coarse sand takes only one fourth of its weight of water, while reduced to an impalpable powder, such as is obtained from clay, it retains nearly three times its weight; which explains, on the one hand, the great humidity of argillaceous soils and on the other the great contraction that clay suffers either by drought in agriculture, or by heat in the arts.

II. The color of the surface of this soil, when it has been long exposed to the air, is white, which has given use to its name of white land, (*terre blanche, terrain blanc.*)

What characterises this soil particularly is that when it is dry, it is easily enough penetrated by water, but when once saturated, it admits no more; the water which then falls upon its surface remains there without being able to penetrate it; this property has caused it to be called *impermeable* soil, because in fact it does not permit the water to pass through to the lower strata.

One of the worst results of this *impermeability* of the soil is the unhealthiness which is experienced in a greater or less degree wherever this soil occurs: the intermittent fevers which are observed more or less on the borders of stagnant waters are very frequently endemic on the argilo-silicious plains, although they may present neither marshes nor ponds.

This unhealthiness, it appears, may be explained in a plausible manner.

The water with which the soil is inundated, not being able to escape in any direction, remains there in a state of stagnation, the general principle of the corruption of water. It forms then in the soil a kind of interior marsh; the sun and the dryness of the air exhale a part. These waters, motionless, diminished, heated by the sun in the warmth of the long summer's days, ferment, become altered, and are sometimes so much corrupted as to become black; they are then an unwholesome drink for men; and at the same time the exhalations of a soil impregnated with corrupted water become unhealthy, as those of the borders of marshes, of ponds, and of all lands temporarily inundated, and which the summer's sun strikes upon, after the waters are drawn off. Then among the inhabitants of a district, in the midst of an atmosphere mixed with deleterious exhalations, numerous intermittent fevers occur, without any neces-

sity for the appearance of marshes or ponds in the country.

III. Almost always under the white [or light colored] upper soil, a sub-soil is found of clayey sand (*sable argileux*) reddish and shaded with gray, or more rarely with red veins.

Its color may enable us to form a judgment of its degree of *impermeability*, and consequently of the degree of humidity of its surface: when the whole mass, soil and sub-soil, is gray, it is more impermeable, and its upper stratum is more wet; when the inferior stratum is reddish or veined, the soil allows the surface water to penetrate a little more, and the upper layer is better drained; it is then remarkable that the gray veins which it contains are more moist than the rest of the mass. The gray color, doubtless arises from the greater abundance of clay, and the red announces a greater proportion of sand, colored by the oxide of iron.

Nevertheless in all its varieties, this stratum retains the water on its surface in a greater or less degree, allows scarcely any to penetrate into the interior of the soil.

IV. The argilo-silicious formation covers vast extents of the two grand divisions of which France is composed, the basin of the Mediterranean, and that of the ocean. In these two positions, so different, although near, we are unable to assign to the deposits of this stratum shades of difference which may very sensibly distinguish them. That which covers a part of the basin of the Rhone, the only basin of France which declines towards the Mediterranean, presents, then the same characteristics as in the other parts of this country which decline towards the ocean. Nevertheless, in the basin of the Rhone, the alluvion may be more clayey, a property which it shares with all the different strata of the surface of the soil in this basin.

The cause of this may be attributed to the numerous formations of gray clay, which we shall call granite clay, that are found in this basin; and besides, to this circumstance, that the river which occupies the bottom of this basin having a much greater descent than those which flow to the ocean, (since Geneva is 300 toises above the level of the sea, consequently in a course of 120 leagues the river falls 300 toises,) the soil there has been more profoundly agitated, the plastic clay has been dissolved in greater masses, and has given more stiffness to all these strata of the basin, and first to the argilo-silicious formation.

V. This formation, generally, covers the *plateaux*, [ridges or table lands] which separate the basins of great rivers, whenever they are not divided by elevated mountains; and when mountains divide them, this formation often rises on their slopes to very considerable heights. Thus it is found on the first steps, or ascent, of the mountains of Autunnois; it is found covering the granites of a part of Haut-Charolais, of the mountains of Forez, and rising to almost equal heights on the two slopes of those mountains which decline, on the one side to the Loire, and on the other

*Here and elsewhere the author uses the term "silicious soils" in contradistinction from "calcareous"—or to designate soils which are not at all calcareous. We have elsewhere used the term "acid soils" for the general class.—ED. FAR. REG.

to the Rhone—that is to say, to the ocean and to the Mediterranean. But then the difference of stiffness is sensible between the formation on the one side of the ocean, and that on the side of the Mediterranean.

It is found at an almost equal height in the environs of Lausanne in Switzerland, of Thonon in Savoy where it rises above the alluvions of the borders of the Lake of Geneva. The great argilo-silicious table land of the basin of the Rhone, which from the gates of Lyons, covering a part of the departments of Ain and of Saone-et-Loire, reaches to the middle of that of Jura, rests on elevated *chaussées* of the granites of ———* near Lyons: and what is very remarkable, is that, as we have said elsewhere, the general declivity of this *plateau* lies in a direction contrary to the course of the rivers which border it; that it goes on increasing in this direction for the 20 leagues of its length, so that the *plateau* towards the heights of ——— ends by rising nearly 100 toises above the course of the rivers which bound it on the two sides.

VI. The fragments of rocks which this formation contains, are always pieces more or less rounded by the movement of waters, and the largest are generally found at the greatest depth. The strata are always horizontal, the sand is almost always coarser in the inferior strata, and its grains are successively finer up to the surface, where they are very minute. All these circumstances evidently indicate successive precipitations from a liquid, in the bosom of which the suspended earthy particles have been at liberty to obey the law of their gravities. It is then an aqueous deposit which has extended itself over vast surfaces. Nevertheless, it is not to be believed that this deposit has been for a length of time carried along by the waters before its precipitation, for it frequently contains fragments whose angles still remain and which have not been rolled long enough to become round. In the basin of the Seine the flints of chalk beds, which are there met with still preserve, in part, their native forms; and the fragments of mill-stone (*silex carie*) which are found in Sologne are not yet rounded, although they have been rolled; and finally the rolled flint stones which are found in the argilo-siliceous deposit of the Rhone belong to the ancient alluvions of the basin, and have not received their form in the various movements of the deposit in which they now occur.

VII. Every where this stratum covers the great formations and is no where covered by them; it is then evidently the last of the great revolution which has agitated the surface of the globe.

VIII. It does not appear possible to attribute it to fresh waters, to the formations, always partial, of river waters, which take a distinct character in each basin, and generally occupy its bottom. We do not find

in it the fresh water remains so numerous in marls, as well the stony, as the earthy kinds; and, besides, when the basins of rivers not separated by mountains, this formation, occupies the whole extent of the intermediate ridges or table lands. Finally, the alluvion placed in the basin of the ocean rises on the slopes of the mountains to the same relative height as that placed in the basin of the Mediterranean; and where these mountains are depressed, the strata of this alluvion unite, and are confounded.

This stratum of identical composition which covers such vast extents in countries distant from each other, which has risen above the basin of rivers, which unites the basins of seas, can, it seems only be owing to the last phasis of the movement of great waters, of the movement of seas themselves confounded together.

It is true that few marine remains are met with in this stratum: the few petrified sea-urchins, which are found in Sologne may there be contemporary with the beds of mill-stones which crop out through the argilo-silicious stratum, and the formation of which rises beyond that of the deposit by which it is covered.

IX. This stratum must then have been deposited by the water over the whole surface; and it would not be difficult to explain how, while continuing to cover the ridges and table lands, it may have disappeared from the bottoms of the basins which it covered. When, by a course of which we are ignorant, the level of the inferior waters was lowered, currents were formed in the interior of the basins of the rivers which in the great reservoirs; the waters quitted the high lands, to collect together in the basins, their natural bed; the waters of the elevated parts of the table lands, to reach their respective basins acquired but little rapidity in their courses of short extent, and only carried off more or less of the last deposit, which was not altered in its composition. But it was not the same in the bottom of the basins; there, rapid currents of great length were established; and impelled by the waters above, they swept off the last deposit and mingled its elements with the deposits of the inferior strata.

When the waters became less rapid, the fragments which they carried along, were successively deposited, commencing with the heaviest; and as they approached a state of repose, the minute particles which the waters retained in suspension were precipitated, and formed the upper stratum, which has become the vegetable stratum, [or mould] of the lower part of the basins, and which is composed of fragments of all the formations carried off by the waters, the latest as well as the most ancient.

X. This is the place to remark that the argilo-silicious deposits which cover the *plateaux*, generally increase in stiffness as they approach the sea; thus, in the basin of the Loire, the sands of the Sologne are lighter than the same kind of table land of La Sarthe; so also, in the basin of the Seine, the table lands of the Gatinais, and of the forest of Fontainebleau, are less stiff than the analogous ones of Bernay, and of the forest of Larche in Normandy.

The causes which have brought about this state of things may be conceived: the sandy particles must have been first deposited, and have formed the alluvions of the more elevated parts of the basins; the waters on retiring have left them successively exposed, and the fine and clayey particles, remaining last in suspension, have been progressively more numerous in the deposits as they approached the sea, and consequently have rendered the alluvions more stiff, more clayey. Thus the soil of the borders of the Seine which often shows little stiffness at Paris, acquires more as it approaches the sea: and in like manner the *littoral* soil of the three rivers, the Rhone, the Saone, and the Aisne, is lighter before their confluence, than that of the Rhone in Comtat, and that of Comtat is less clayey than that of the great plain in Arles: these facts are explained in the same manner as the preceding.

XI. Finding myself involved in the great questions of the formation of soils, I shall not hesitate, at the risk of digressing from my subject to collect here many important facts in agricultural geology.

The argilo-siliceous deposit has been very evidently the last of the great deposits which have covered vast surfaces: it is, in some sort, the last phasis, or general movement of waters, on the surface of the earth; but since then, partial revolutions seem to have taken place in the basins of large and small rivers; there are even some to which we seem able to assign an era, and which do not go beyond the historical ages. Thus many positive and very remarkable facts may induce an opinion that in the basin of the Rhone a great movement of waters must have taken place since the establishment of the Roman dominion in this country. When wells are dug at Marseilles, water is found under a stratum of gravel about 20 feet thick, as its junction with another formation on which we meet with traces of habitation, roads, Roman, Phœnician and Gallic medals. This level of the soil has then been inhabited, two thousand years or more ago, and consequently the stratum of gravel more than 20 feet thick which covers these parts of the basin has been brought into them since, by a movement of waters which no historical recollection recalls.

But if we remark further that in ascending the basin of the Rhone to Arles, to Orange and Valence, to Nîmes, to Lyons, the traces of Roman inhabitation are every where covered with a stratum of gravel many feet thick—that at Bourg, situated in the same basin, are found medals, instruments of a contemporary date and of the same sort as those met with at Marseilles, and every thing which characterises an ancient level of habitation between two strata of gravel analogous to those which cover them elsewhere—we shall have good reason to believe that the stratum above the medals which have been found, must be owing to the one same revolution, which consequently must have changed the whole face of the lower part of the basin of the Rhone.

This stratum at Marseilles, and in the the greater part of the places where it oc-

*These blanks occur in the French publication and probably were made necessary by the illegibility of the manuscript. In the several pieces by M. Puvion as published, there are numerous indications of mistakes of the author's words; and sometimes others of his meaning—so manifest, that the translator has ventured to alter them.—Ed.

curs, cannot be owing to the ruins of habitation, to the rubbish of destruction, which raises the inhabited surface in populous cities; for the traces of habitation, the medals, the roads, mould (humus) bricks and pottery, in angular pieces, would be found throughout the whole thickness of the stratum, whereas this is composed without mixture of rolled pebbles of silicious gravel of the same kind, covering calcareous gravels disposed in horizontal strata, identical in thickness and in composition, which could be owing only to a natural formation deposited from the bosom of the waters.

But still farther traces of this inundation are found. At the junction of the basins of the Ain and the Rhone, there exists a great plain which bears the name of Valbonne, (*Vallis Bona*); a name evidently given by the Romans, and of which the soil is now composed of an arid stratum of silicious gravel like that which is found all along the basin of the Rhone; but we should consider as certain, that this stratum did not cover the valley when it received the name of *Vallis Bona*; it may then be believed, that the alluvion of good quality which covered this valley, was carried off by the great flood which has thrown over a great part of the surface of this large basin, all those increments of gravel which have covered and devastated the inhabited surface. In support of this conjecture, we find in Bas-Bugey at Meximieux, and in Dauphiny, at Saint Priest, opposite the plain in question, a stratum of calcareous soil of good quality, which often rises many feet above the alluvion of gravel, this stratum, which at several points bears traces of having been torn away, rose, it may be believed, above the borders of the Ain and the Rhone; it covered consequently, the plain between Meximieux and Montluel, and gave occasion to its name of *Vallis Bona*, which was preserved to it after the waters had deprived it of its qualities. An aqueous revolution then has taken place in the basin of the Rhone; this revolution must have been subsequent to the establishment of the Roman power, and to this revolution the stratum of silicious gravel succeeded, which from the borders of the lake of Geneva, to those of the sea, covers such vast extents.

We shall not continue farther the discussion of this important question of agricultural geology, for fear of exceeding the proper limits of this journal.

XII. In all movements of great waters which have taken place, each basin of a river has formed a new upper stratum which has become the vegetable stratum (or surface soil;) and this is distinguished by shades of formation which are peculiar to itself, and which it has received from the fragments of the mountains which border upon it, from those brought by the water of its confluent, mixed with the great general deposits. Thus are explained those analogies of soil and of formations which are found throughout the whole extent of any one basin, and in the secondary basins themselves.

We have designedly gone back to the origin of these analogies of soil, that we

might recur to an important idea in agriculture. It is this: that the formations in any one basin being composed of the same fragments, and owing to the same revolutions, the soil of these basins presents throughout their whole extent a great analogy, and consequently, the practices of agriculture which have succeeded in one point, may be applied, the difference of climates excepted, to the analogous formations; agriculture perfected on some points of a basin, may give lessons almost certain for its whole extent.* Thus the study of agriculture, to become more profitable, instead of being made according to a political association, by Departments for example, ought to be made by the basins of rivers; it would give rise to many fewer mistakes, and consequently, to much more success. The rules and successful practices of a basin, should be studied anew, if we wish to make an application of them to another basin in which the composition of the soil is owing to different circumstances.

XIII. This caution, this fear of mistakes, ought to have its full effect when agriculture is practiced on the great argilo-silicious deposits which covers such vast extents, and presents every where the greatest analogy. The practice of agriculture on this deposit, might then have general rules which it would be very important to collect; but it must first be well characterized, in order that it may be every where known.—We shall therefore resume the course of our observations.

The soil and the sub-soil of this stratum, although of different shades, appear to be of identical composition, as experience daily proves in a striking manner. When by any circumstance the whitish stratum of the surface is removed, so as to leave only the reddish stratum of the sub-soil, some years of cultivation and manuring, or even of spontaneous vegetation without culture, are sufficient to give to this reddish sub-soil the gray color of the rest; and, in the same manner, when this reddish earth is carried out on a cultivated soil, the shade which it gives quickly disappears by mixture with the rest, and by the effect of cultivation.

The proof of this identity is still more complete, if we remark that in digging into the lower parts filled up by the falling of more elevated portions of the soil, we find the red soil shaded with gray, or the gray shaded with red veins in the middle of the rubbish; which prove the new increment, with all the characteristics which it has elsewhere, its stiffness and its impermeability.

The sub-soil and the stratum of the surface, are then nearly identical, its formation throughout the whole thickness is therefore the production of the same aqueous revolution; only the oxide of iron which colors the sub-soil, loses its color by cultivation.

* It may not be useless to all readers to say, that by the "basin" of a river, the author does not mean merely the valley or lower lands through which it flows, but the whole area, high and low, which lies within its limits, intersected by all the tributary streams of the river. Thus the basin of the Mississippi takes in the immense area from the summits of the Rocky Mountains to those of the Alleghany.—Ed.

XIV. The effect of frost upon this soil characterizes it in a peculiar manner; the water at the surface when it is in no great quantity, often freezes in vertical threads which sometimes rise six inches, and resemble a vegetable growth. But what is still more remarkable, is, that the soil rises up by freezing much more than the greater part of calcareous or alluvial soils. New vegetables, planted, or even sown, are torn out of it in a manner truly astonishing; plantations of wood of that year, or even of the year preceding, were torn out at two different times by the freezing without snow, in February, 1831; and sowings of seapines, (*maritimes*) made the year before, were thrown out of the soil. It is therefore prudent to wait till the end of winter to make plantations in such soils, and not to dig the holes beforehand, that water may not get into them and remain; and as the effect of frost is less sensible on the parts covered with turf, the little holes, after planting, should be re-covered with turf, to prevent as much possible as new losses.

The rising of this soil from freezing, occasions besides the great inconvenience of much deeper roads than on calcareous soil.

These effects are explained in a plausible manner from the nature of the soil itself. This soil contains much silex in a state of very minute division, either free or combined with the clay; this silex as we have seen, takes a greater quantity of water than other descriptions of soil; the water which penetrated this soil expands, as we know, by freezing; it expands then at the same time the soil which it penetrates; the expanded soil rises up, and raises with itself the plants and their roots when they do not reach to great depths.

The surface of the soil in thawing first, and losing a part of its water by evaporation, is contracted and sinks upon the rest of the soil, and leaves exposed a part of the roots which cannot descend again with it because their extremities are fixed in a soil still frozen: the next day this effect is renewed, and the plant is soon partly or entirely out of the ground, according to the length of its roots.

The rising of the soil is greater in proportion as it is more clayey, because then it contains more silex in the state of impalpable powder, or it absorbs more water; it is greater than in the ordinary calcareous soil, because carbonate of lime receives only 85 per cent of water to 100 of impalpable powder, while silex takes 280 per cent. There are, however, some calcareous soils which also greatly expose the roots of vegetables; these are the marly (*marneux*) calcareous soils; thus, in the freezings without snow in February last, our calcareous soils of the plateaux, whether *erres-mares*, or our marled lands, had more plants thrown out than our common white lands, (*terres blanches*.) We attribute this to the fact that our *terres mares* are nothing more than a mixture of the argilo-silicious soil of the plateaux with the inferior marly stratum; but our marl which contains commonly 40 per cent. of carbonate of lime, has 30 per cent. of clay or very fine silex, while our white lands contain a great deal

of silex in the state of sand. Our *terres mares* and our marled lands, contain then, relatively, more fine silex than our ordinary ridge or table lands, and for this reason may expose the roots of plants still more.

XV. But with the same sub-soil, almost always clayey, the surface varies much in stiffness and tenacity; it passes from a state the most tenacious, and the most difficult to work, to the lightest sand, which is carried off by the wind; and yet under all these diversities of soil, there is found almost everywhere the *impermeable* red sub-soil.

When the upper soil is clayey, it is then *accidente* formed of a collection of small basins or ponds, which serve to drain it; the waters have not levelled the surface, or rather after having levelled it, they attacked it in places, and formed in it basins or hollows which receive the water of the surface, and without which it would be impossible to cultivate it.

In this case, it may be conceived that the soil and the sub-soil are in their nature clayey, of an *impermeability* almost absolute; this soil is also very wet, since it contains a great deal of fine silex, which absorbs 280 per cent. of water, and to derive a *lyantage* from it, the cultivator is obliged to add to its natural declivity by artificial beds or ridges by the plough. Wheat, rye, and most agricultural productions, succeed more or less upon it when the drawing off of the superabundant water has been effected.

The dog's-tooth grass, (*chiondent*), *agrostis stolonifera*, *herbe trainasse*, the little motherwort (*matricaire*) prey upon this land and impose on it, as an absolute condition of production, the necessity of a very careful cultivation; such is, mostly, the great *plateau*, which extends from the gates of Lyons into three departments, the Ain, Saone-et-Loire, and Jura; such are nearly, also, Puysie in Yonne, a part of the plain of Forez in Haute Loire, and the part of Sologne in the Cher and Loire, where fish ponds are found.

But if this soil, to yield produce by cultivation, requires to be carefully drained, the necessity for this is almost as great to produce woods with advantage, especially in the most clayey variety; without this, on its surface covered with little pools, without mellowness and without strength, the greater number of large vegetables languish; the oak, particularly, is frozen on it almost every year. Then it becomes necessary that ditches, judiciously placed, may collect and carry off the superabundant waters of the surface: with this care, the aspect of the soil changes, large vegetables grow with natural vigor, and are no longer subjected to any other than the great general accidents depending on temperature and climate.

XVI. The elevated parts of each *plateau*, when the waters have had less effect, are generally of a level and sandy soil on the borders, the lower parts are the most *accidentees* and of stiffer soil. Thus in the great *plateau* or basin of which we speak, Bresse is more moist, more clayey, more *accidentee* than Dombes, which is at once more elevated and more sandy than it; and

it is the same case elsewhere in the same soils.

But this great *plateau* which belongs to the basin of the Rhone, appears to be the most wet of all those of the same nature which are met with on the French soil; nowhere is it necessary, as with us, in order to derive a profit from the soil, to cut it by perpendicular ditches into small pieces ridged in the middle, to increase thus the natural declivity by artificial slopes, and finally, to add to all these labors, cultivation by bedding or water-furrows. But what increases still more in our country the difficulties of cultivation, are the rains, amounting to 45 inches annually, which keep the surface of a soil, that does not allow the water to penetrate to the interior in a state of inundation, unless the flowing off of the moisture is hastened by artificial means. And what is very remarkable, is, as we have just said, that the soil is more clayey in the low parts of the *plateau*, where the waters appear to have carried off a greater thickness of the strata. Thus, the soil of Bresse is more clayey and more troublesome, and difficult to cultivate than that of Dombes; in Dombes artificial ridging is less necessary; ploughing in raised beds is generally sufficient to drain off the water; and sheep succeed there, while they perish almost every year in Bresse.

Fish ponds succeed well only in this clayey variety of soil; the greater part of those which were in a calcareous soil, are now dried, and yield a produce in grain and forage much superior to what they did in fish.

XVII. Two conditions are absolutely necessary for this manner of employing land (for fish ponds,) and these are found united only in the clayey variety of this soil. The first condition is a very great slope, and the second, an *impermeable sub-soil*. For a good pond of some extent, there should be 8 or 10 feet of water near the dam, and consequently, at least 8 feet of slope in the surface, from the commencement of the pond to the dam; a slope certainly very great, and which is hardly to be found except in the beds of torrents.

To keep the pond full during the summer, when there is little rain, which is absolutely necessary for the preservation of the fish, it is in a manner indispensable, that the inferior soil should retain the water, and should, consequently, be *impermeable*.

XVIII. Most frequently, when the soil is light, the surface is level, it is hardly ever inclined: there is only a slight slope on the nearest water courses; consequently, in such places, there are no fish ponds; the soil, indeed, still rests, almost always, on the *impermeable stratum*; but it is often at so great a depth, that the surface which suffers from wetness in rainy weather, suffers also from drought in dry, warm seasons.

These two varieties of land, the clayey and the light, although of the same nature and of the same formation, may be distinguished from each other, the first by the name of *argilo-silicious*; and the second, by that of *silicioargillaceous* soil.

Fish ponds in the plains of the light or

silicio-argillaceous lands, are evidently impossible, unless they could be established on the water courses which traverse them; which would destroy all the resources of the country in forage, by covering all the meadow lands.

It is of this variety of soil that is formed, in part, the *plateau* which separates the basin of the Seine from that of the Loire, which contains such vast extents of wood, and some cultivated parts; on this *plateau*, are found the forest of Fontainebleau, and that of Montargis.

Such is also the part of Sologne, in the basin of the Loire, from Gien almost to Bourges, and which separates the Cher from the Loire: it forms a great *plateau*, which rises on one side above the vale of the Loire, and on the other, above the basin of the Cher; such are all the *landes* [sandy plains or deserts] of Bourdeaux, and a great part of those of Bretagne and of Maine. In this kind of soil, rye, buckwheat, and some fields of potatoes, are almost the only productions of the cultivated lands.

Sheep, which succeeded ill, or not at all, on the argilo-silicious lands, are often in the *silicio-argillaceous* lands, the only means employed to derive a profit from the soil. On these, the oak often succeeds well, and suffers less than on the other variety of soil, but the chestnut is the preferable tree.

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RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

OFFICE OF THE WETUMPKA AND COOSA R. R. Co. }
WETUMPKA, ALA., 29th July, 1836. }

THE Directors of the above Company are desirous of securing the services of a competent resident Engineer, to survey and locate the route of the Wetumpka and Coosa Railroad, commencing at this place. The route of the road will pass through a country that is considered as healthy as any in this latitude. Persons desirous of embarking in such an undertaking will please address the undersigned at this place.

W. H. HOUGHTON,
Sec W and C. R. R. Co.

The Evening Star and Courier and Enquirer, New-York; the Commercial Herald, Philadelphia; Baltimore Gazette; National Intelligencer, Washington; Richmond Enquirer and Whig, Richmond, Va.; and Charleston Mercury, will please give the above eight weekly insertions, and send a copy containing the advertisement, together with their bills, to the undersigned.

(34-54) W. H. HOUGHTON.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9-ly

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4-ytf

HUDSON AND DELAWARE RAILROAD,

NOTICE TO CONTRACTORS.

SEALED PROPOSALS will be received at the Office of the Hudson and Delaware Railroad Company, in the village of Newburgh, until the 10th day of October next, at 2 o'clock, P. M., for the Grading, Masonry, Bridging, &c., of their road from the west side of Chamber's Creek to Washingtonville, a distance of ten miles.

Plans, Profiles, Specifications, &c., will be in preparation, and exhibited ten days previous to the letting.

JAS. B. SARGENT, Engineer.

Newburgh, Aug 24, 1836. to 10-35

NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordsville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 mil s.

J. EDGAR THOMSON,
Civil Engineer.

33-4220

PATENT RAILROAD, SHIP AND BOAT SPIKES.

The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing as to keep pace with the daily increasing demand for his Spikes.

(1J23am)

H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersink holes and mired joints,

	lbs.
150 tons 24 by 4, 15 ft in length, weighing 4 ⁵⁰ per ft.	31 ⁵⁰
280 " 2 " 4, " " " "	24
70 " 14 " 4, " " " "	1 ²⁵
80 " 14 " 4, " " " "	1 ²⁵
90 " 1 " 4, " " " "	1 ²⁵

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed. Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 ft et 6 inches, to 13 feet 24, 24, 34, 34, 34, and 34 inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON.

28-tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD Co. }

New Orleans, 19th May, 1836. }

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,

JNO. B. LEEFE, Secretary.

28-3m.

THE NEWCASTLE MANUFACTURING COMPANY,

incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

Mr. EDWARD A. G. YOUNG,
Feb 20-ytf Superintendent, Newcastle, Del

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co., }

July 25th, 1836, }

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cutstone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.

E. H. GILL, Chief Engineer.

30-to 10

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS. WE the subscribers having formed a co-partnership under the style and firm of Durfee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE

33-4f.